

SONY®

PORTABLE VIDEOCASSETTE RECORDER
TRAGBARER VIDEO-CASSETTEN-RECORDER

BVU-50P

Professional **U-maticHS**

OPERATION AND MAINTENANCE MANUAL
BEDIENUNGS- UND WARTUNGSANLEITUNG

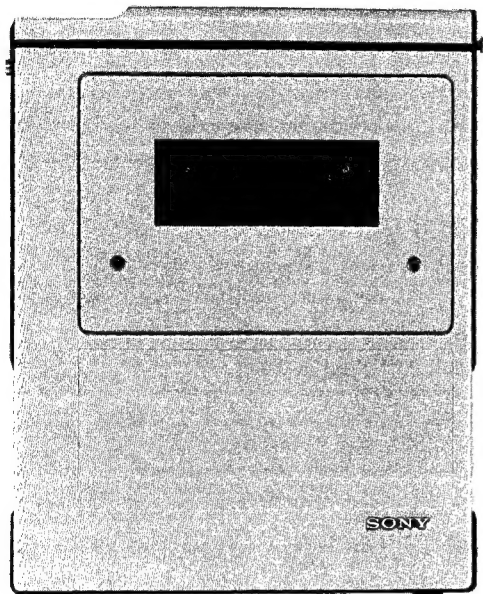
2nd Edition (Revised 12)

Serial No. 10141 and Higher

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SECTION 1 OPERATION

This videocassette recorder is a versatile machine which displays superb operating ease and portability for recording applications. It was developed for electronic news gathering, and when combined with the Sony portable colour camera equipped with 14-pin CCQ-camera cable, it is able to give an even more impressive demonstration of its many talents.

1-1. FEATURES

Compact and lightweight

The recorder weighs only 7.9 kg (17 lbs. 6 oz.) including the batteries, shoulder strap and cassette. The main unit itself is a light 5.7 kg (12 lbs. 10 oz.).

Low power consumption

The circuitry is designed for recording only applications and for the low consumption of power. Thanks to this design, the power consumption is a low 12 W.

Power saving mode

The model consumes only 6 W of power in the power saving mode.

High-quality pictures

As the recorder conforms to the U-matic H (High-band) standard, it provides, despite its compact size, a picture with a quality comparable to that of the studio-type U-matic H VTRs (like the model BVU-200P) for broadcasting stations.

Composite shooting

Videocassette programs are composed shot-by-shot without any irregularities between scene changes. Vertical-interval timing with a tape back-up feature guarantee clean cuts every time.

Real-time counter

An LED display indicates the recording process in real time. The contents of the display will be stored even when the power is switched off, or the main battery depleted or removed.

Auto or Manual recording

While recording, audio may be controlled manually (limiter recording) or automatically.

Display lamps

The RF, SERVO, HUMID, SLACK, TAPE END and BATTERY indicators tell the operator at a glance just what is happening. An audible alarm can be heard simultaneously through the earphone.

Before end warning

The TAPE END lamp blinks for several minutes to warn you that the tape is approaching the end. At the end of the tape, the tape transport is automatically stopped and the lamp lights. In the same way, the BATTERY lamp lights to tell you that the voltage of the battery has fallen below its rated value and that the tape transport will be stopped after a few minutes.

Time code recording

The EBU time code can be recorded by connecting a time code generator BVG-100PS to the recorder.

Variable earphone level

The earphone level can be varied from -20 to -32 dB.

One-cable camera connection


The signals and power can be supplied to a colour camera simply by connecting a single 14-pin CCQ-camera cable.

Long pause

The pause mode will automatically be released after about 8 minutes of use and the recorder will enter the long pause mode, in order to protect the tape and video heads.

1-2. SPECIFICATIONS

Mechanical section

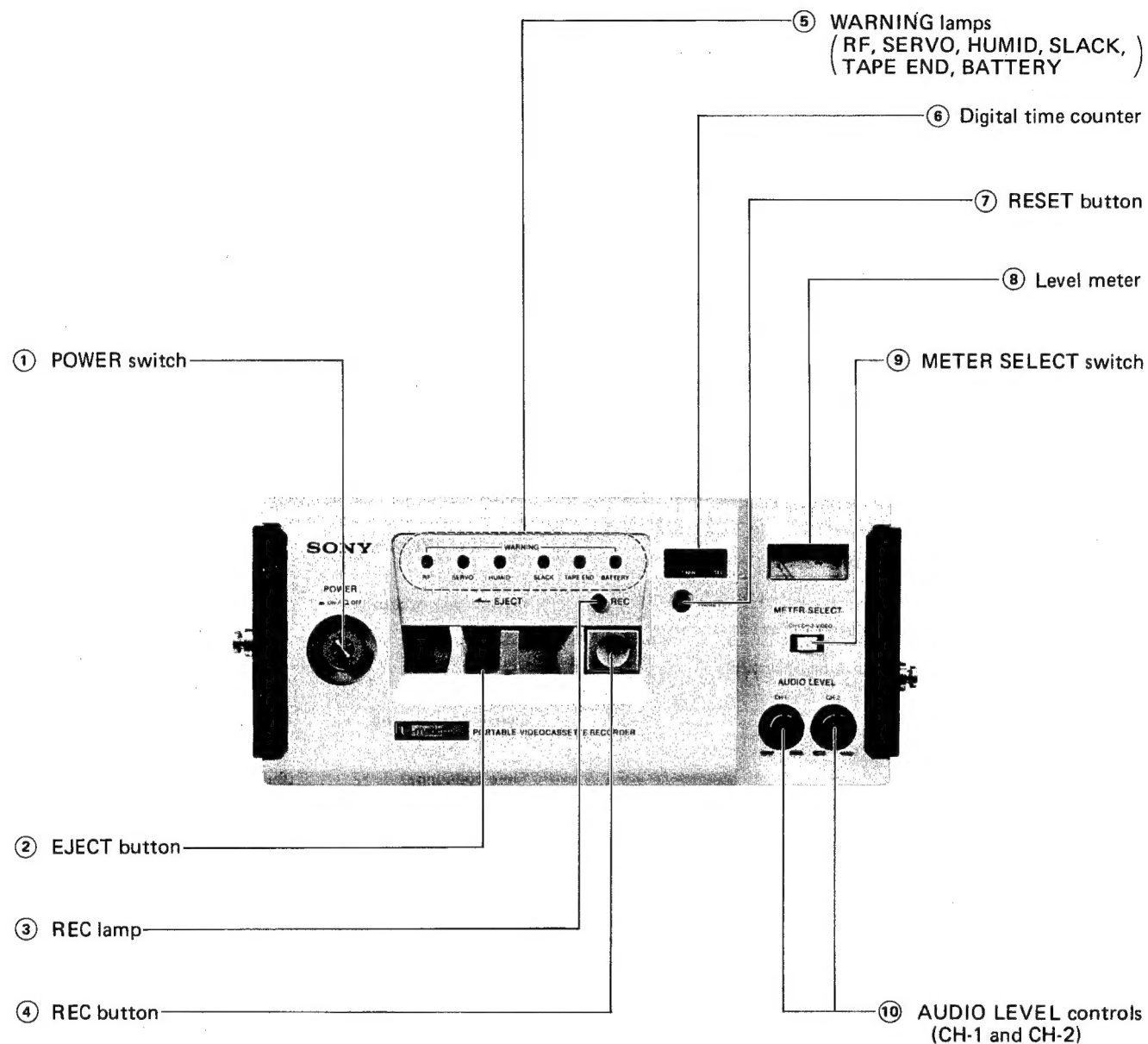
Weight	Main unit: 5.7 kg (12 lbs. 10 oz) Shoulder strap: 0.2 kg (8 oz) BP-90 battery pack: 1.7 kg (3 lbs. 12 oz) KCS-20BR videocassette: 0.3 kg (11 oz)
Dimensions	270 (W) x 125 (H) x 335 (D) mm
Videocassettes	U-matic  KCS type (3/4-inch cassettes)
Tape compatibility	Can be used with U-matic H VTR
Tape speed	9.53 cm/sec
Wow and flutter	0.2% rms } (with standard play- ±0.2% (DIN) } back machine)
Continuous recording time	260 minutes for BVU-50P only, with fully charged BP-90 battery pack. 70 minutes when power is supplied to the camera (BVP-300P)
Recording time	Maximum 20 minutes (with KCS-20BR videocassette)
Connectors	
CAMERA	14-pin (for CCQ-cable) connector
VIDEO IN	BNC connector
TIME CODE IN	DIN 5-pin connector
MIC IN CH1/L, CH2/R	XLR female connector
EARPHONE	Mini jack
Operating temperature	0°C to +40°C
Operating humidity	Less than 85% (relative humidity)
Storage temperature	-20°C to +60°C
Operating position	Horizontal or vertical

Electrical section

Power requirements	DC 12 V \pm ₁ ⁺² V Using BP-90 battery pack (nickel-cadmium 3.5 Ah) AC power can also be supplied using AC-500CE AC adaptor (optional).
Power consumption	12 W (12 V, 1 A) 6 W in power saving mode
Video	
Recording system	Luminance: FM Chroma: SC low-range conversion
Input	PAL composite video, sync negative 1.0 V ±6 dB, 75 ohms, unbalanced
Horizontal resolution	260 lines for colour (with standard playback machine)
Video signal-to-noise ratio	Better than 46 dB for colour (with standard playback machine)
Audio	
Input (MIC)	-60 dB, 3 k ohms, balanced (matches 600-ohm microphones)
Output (EARPHONE)	-20 dB to -32 dB variable (matches 8-ohm earphones)
Frequency response	50 Hz to 15 kHz (with standard playback machine)
Distortion	Less than 2.5% (with 1 kHz reference level, standard playback machine)
Signal-to-noise ratio	Better than 48 dB (3% distortion, with standard playback machine)
Time code input	0 dB ± 6 dB, 10 k ohms, unbalanced
Accessories supplied	Carrying case Shoulder strap Carrying straps Time code generator case (for BVG-100PS) Time code generator attachment
Related equipment and optional accessories	Battery pack BP-90 (nickel-cadmium batteries, 3.5 Ah) Battery charger BC-210CE AC adaptor AC-500CE Time code generator BVG-100PS Earphone ME-20B Silver oxide and mercury batteries (Eveready S-76 or similar product)

1-3. LOCATION OF PARTS AND CONTROLS

1-3-1. Function control panel



① **POWER switch**

Depress to turn on the recorder. The tape is drawn out of the cassette and threaded around the head drum. Power will be supplied to a camera, if connected, even if the cassette compartment is raised. To turn off the recorder, depress the switch again. (Push-push type). The tape is unthreaded and stops.

The digital time counter ⑥ lights up when the power is supplied and can be used as the power pilot lamp.

② **EJECT button**

Slide this button to the left, in the direction of the arrow, to raise the cassette compartment for insertion or removal of a videocassette. If a cassette is inserted when the power is on, the tape is threaded and the recorder is set to the standby mode. When the button is depressed to remove a cassette, the tape will be unthreaded and the cassette compartment will pop up.

③ **REC lamp**

④ **REC button**

Press to start recording. The REC lamp ③ will blink. To return the recorder to the standby mode, press this button again. The tape stops and the REC lamp goes off.

- In the standby mode, the tape is in close contact with the head drum while the head drum is still rotating. It is therefore recommended that the power be switched off when the idling time between shots for recording is prolonged, in order to prevent the heads from clogging.

⑤ **WARNING lamps**

These lamps display the operating state of the VTR.

RF lamp

This blinks when the video heads are clogged or when there is no recording due to a failure in the recording circuit. Besides the record heads, the BVU-50P is equipped with an RF playback head and the lamp serves to detect whether or not the vertical sync signals are being played back.

SERVO lamp

This blinks when the drum servo is not locked.

HUMID lamp

This lights when moisture condensation has formed on the head drum or when condensation is about to form.

SLACK lamp

This blinks when the tape is slack at the take-up side (from the capstan to the take-up reel) of the tape transport system. At the same time, the tape run is automatically stopped in order to prevent the tape from becoming entangled in the transport system.

TAPE END lamp

This lamp blinks for several minutes before the end of the tape—for about 1.5 minutes when using Sony KCS-20BR videocassette tape, but this length is variable depending on the type of videocassette used. The lamp lights up when the tape comes to an end and the tape transport is automatically stopped.

BATTERY lamp

This blinks when the voltage supplied by the BP-90 battery pack falls below 11 V indicating that the batteries are almost dead.

The lamp lights steadily when the voltage falls to 10.8 V, and the tape transport is automatically stopped.

⑥ **Digital time counter**

The counter indicates the recording time in minutes (MIN) and seconds (SEC). Even when the power to the main unit is switched off, the counter digits will be held by the battery power source used exclusively for the memory. (Refer to page 9 for the memory battery.)

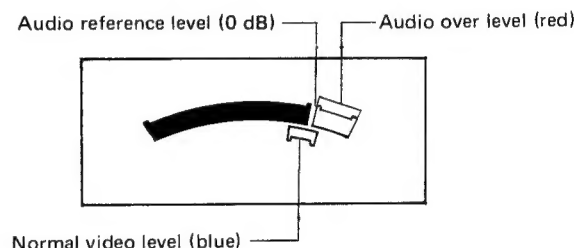
- When power to recorders not equipped with a memory battery is switched on, sometimes the counter may display only parts of digits or may not display some digits at all. When this happens, press the RESET button ⑦ to reset the counter to 00 MIN 00 SEC.

⑦ **RESET button**

Press to reset the time counter display to 00 MIN 00 SEC. Normally, insert a cassette first, then depress this button to start recording from the zero indication.

⑧ **Level meter**

This displays the level of the signal which has been selected by the meter select switch.



⑨ **METER SELECT switch**

This assigns the LEVEL meter ⑧ to any one of three display modes. It is also used to select the channel of the earphone.

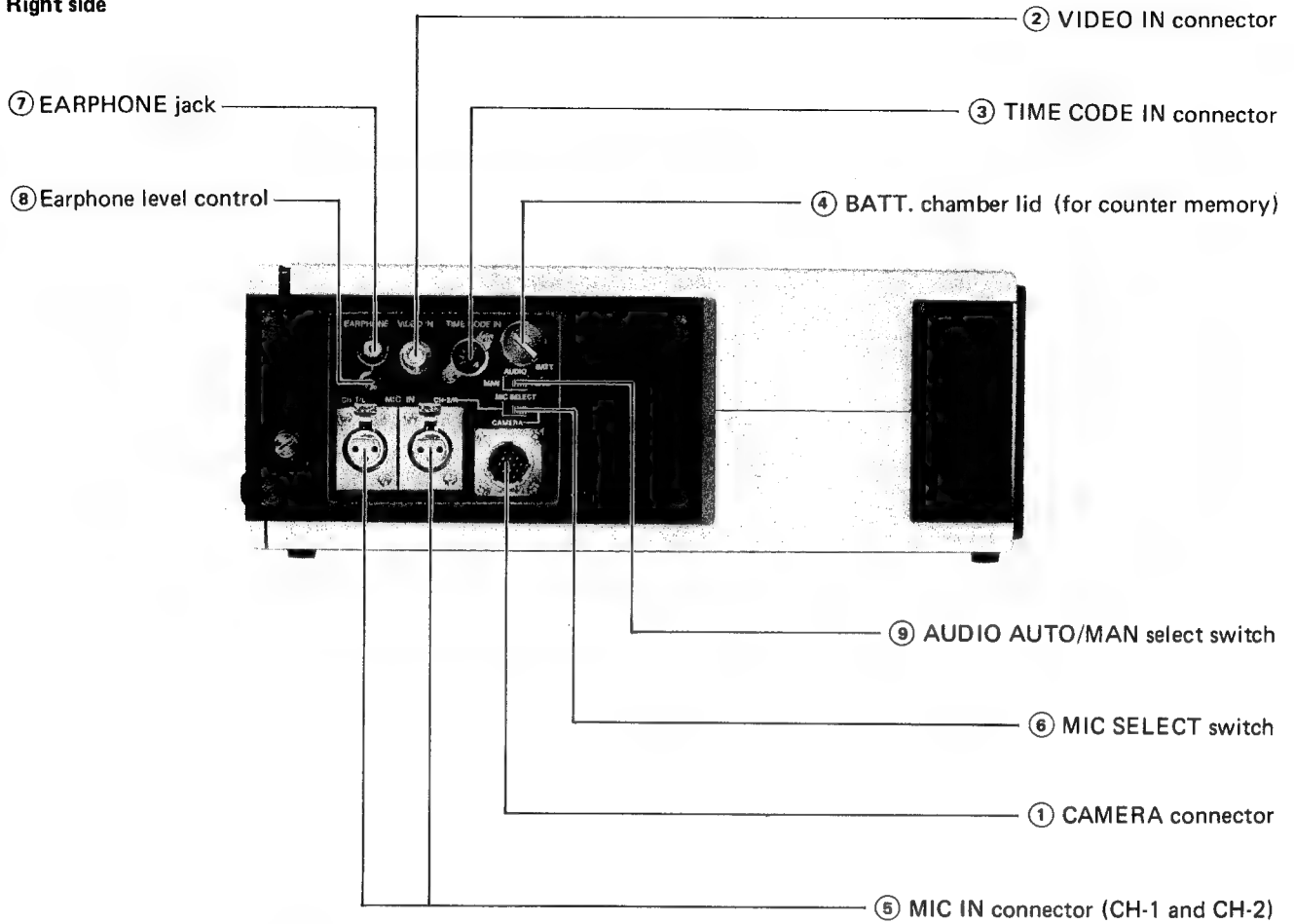
Switch position	Level meter display	Earphone
CH-1	Recording level of audio CH-1	CH-1
CH-2	Recording level of audio CH-2	CH-2
VIDEO	Recording level of video	CH-1 + CH-2 (Mix)

⑩ **AUDIO LEVEL controls**

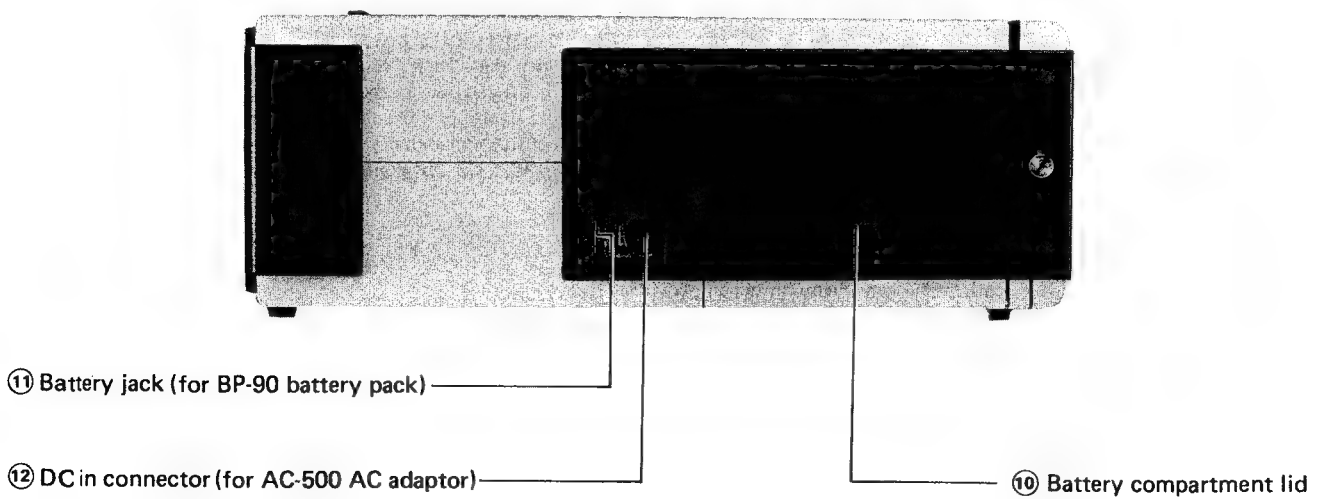
With the AUDIO AUTO/MAN select switch on the right side of the recorder in the MAN position, adjust the audio recording level of the channel 1/L with the AUDIO LEVEL CH-1/L control, and that of the channel 2/R with the AUDIO LEVEL CH-2/R control.

1-3-2. Connector panel

Right side



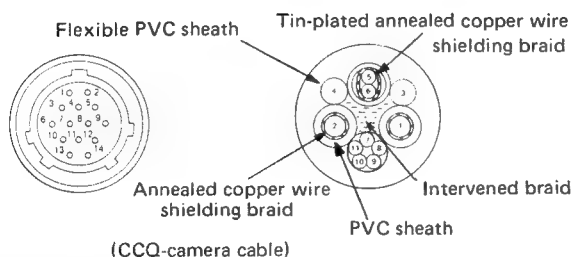
Left side



① CAMERA connector

Connect the output signals of the Sony colour camera equipped with CCQ-camera cable.

Pin no.	Core no.	Remarks	Colour
1	4	DC 12V OUT (E)	Black
2	3	DC 12V OUT (HOT)	
3	5	MIC IN (X)	Red
4	6	MIC IN (Y)	White
5	Shielded	MIC IN (GND)	
6	2	VIDEO IN (X)	Blue
7	2 Shielded	VIDEO IN (GND)	Blue
8			
9			
10	7	BATT INDICATOR OUT	Black
11	8		Brown
12	9	REC & ALARM SIG OUT	Red
13	10	REC SIG IN	Orange
14	11	POWER SAVE IN & AUDIO MONITOR OUT	Yellow



② VIDEO IN connector

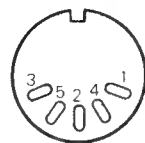
When the output signals of video colour cameras (or VTRs) are connected, these signals can be recorded.

- When the VIDEO IN connector is being used, the VTR will not start recording if there is no video input signal. It is therefore possible to start and stop the VTR by supplying and cutting off the video signals during recording. (See page 12)
- Do not use the VIDEO IN connector and the CAMERA connector ① at the same time. This will cause the servo system to function irregularly and the VTR will not be set to the recording mode.

③ TIME CODE IN connector

When the EBU time code generator BVG-100PS (optional) or equivalent is connected, the EBU time code can be recorded at the same time as the video recording.

- Switched video signals are fed out to start the time code generation and so time codes which are synchronized with the start and stop of the VTR can be recorded.



(External view)

1. SW'D VIDEO
2. TC IN
3. GND
4. GND
5. GND

Note: Switched video signals are fed during recording (while the tape is moving). The time code generator then starts to count.

④ BATT. chamber lid

The batteries for the counter memory are loaded here. These enable the time counter digits to be held even when the power is switched off or the main battery removed for replacement. (For details, see page 9.)

⑤ MIC IN connectors (CH-1/L and CH-2/R)

Connect low-impedance microphones (600 ohms) with a Cannon connector.

⑥ MIC SELECT switch

Use this switch to select the recording input signals of CH-2/R as follows:

CAMERA: For recordings using the CCQ camera cable. Signals are supplied from the camera's accessory microphone.

CH-2/R: For recordings from a microphone connected to CH-2/R of MIC IN connector ⑤.

⑦ EARPHONE jack

The audio recording can be monitored by connecting an 8-ohm earphone (such as the Sony ME-20B) here. The METER SELECT switch (see page 7) can be used to select between CH-1, CH-2 and CH-1 + CH-2 (MIX).

If any of the WARNING lamps are blinking or lighting a 1 kHz tone will be heard from the earphone. (For details, see page 11.)

⑧ Earphone level control

Vary the earphone level over a range of -20 dB to -32 dB.

⑨ AUDIO AUTO/MAN select switch

Selects automatic or manual audio recording level control.

⑩ Battery compartment lid

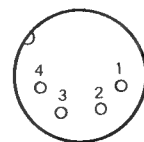
Insert the battery pack BP-90 here. (For details, see page 8.)

⑪ Battery jack (for BP-90)

Connect the cord of the BP-90 to this 1-pin connector at the left.

⑫ DC IN connector (for AC-500CE)

Connect the DC output cord of the AC adaptor (AC-500CE) to this XLR 4-pin connector.



(External view)

1. GND
- 2.
- 3.
4. +12V

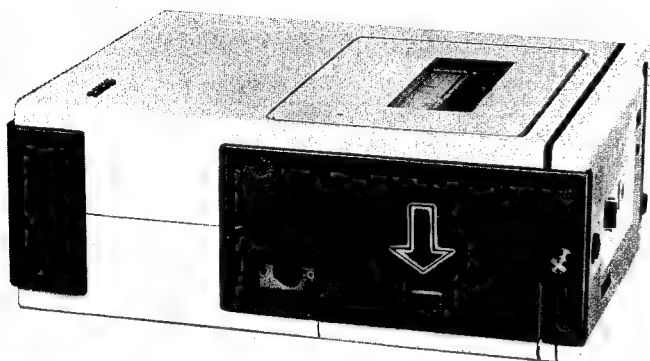
1-4. CONNECTIONS

1-4-1. Power supply connections

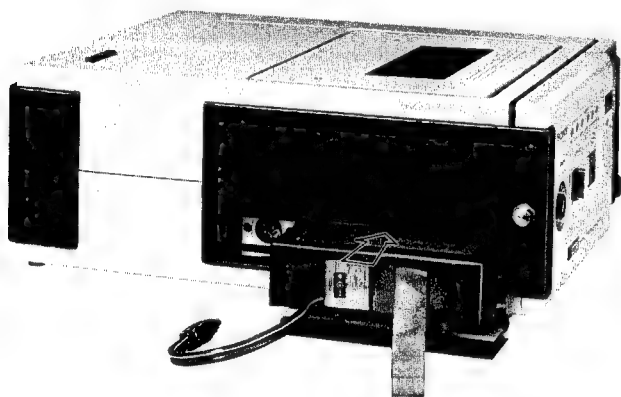
Battery operation

Load the fully charged BP-90 battery pack as follows.

- 1) Pull the center knob of the battery compartment lid down in the direction of the arrow, and open the lid.



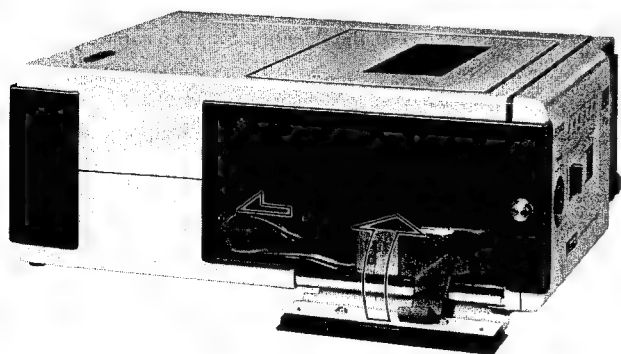
- 2) Insert the BP-90 battery pack (optional) as shown.



- Do not use any battery pack other than Sony's product. Polarity of the battery plug may differ with the manufacturers.

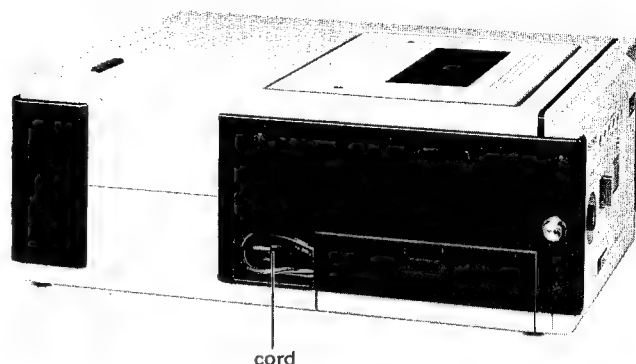


- 3) Connect the cord of the BP-90 to the battery jack (on the left) and store the cord as shown.



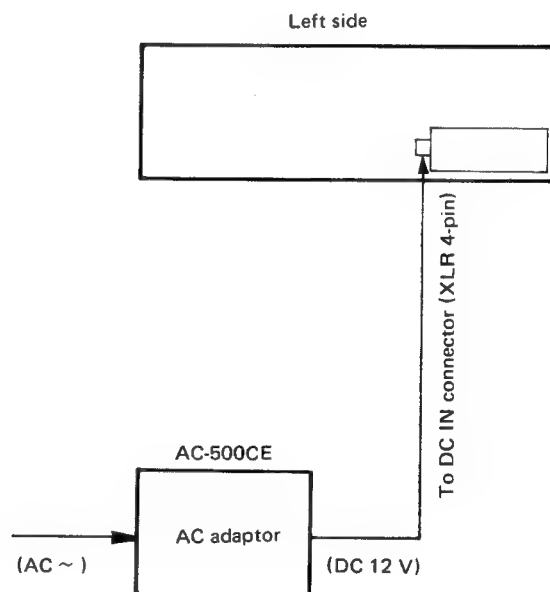
Return the lid and close.

- 4) Put back the lid and close it.



AC adaptor-powered operation

Connect as follows for AC adaptor operation.

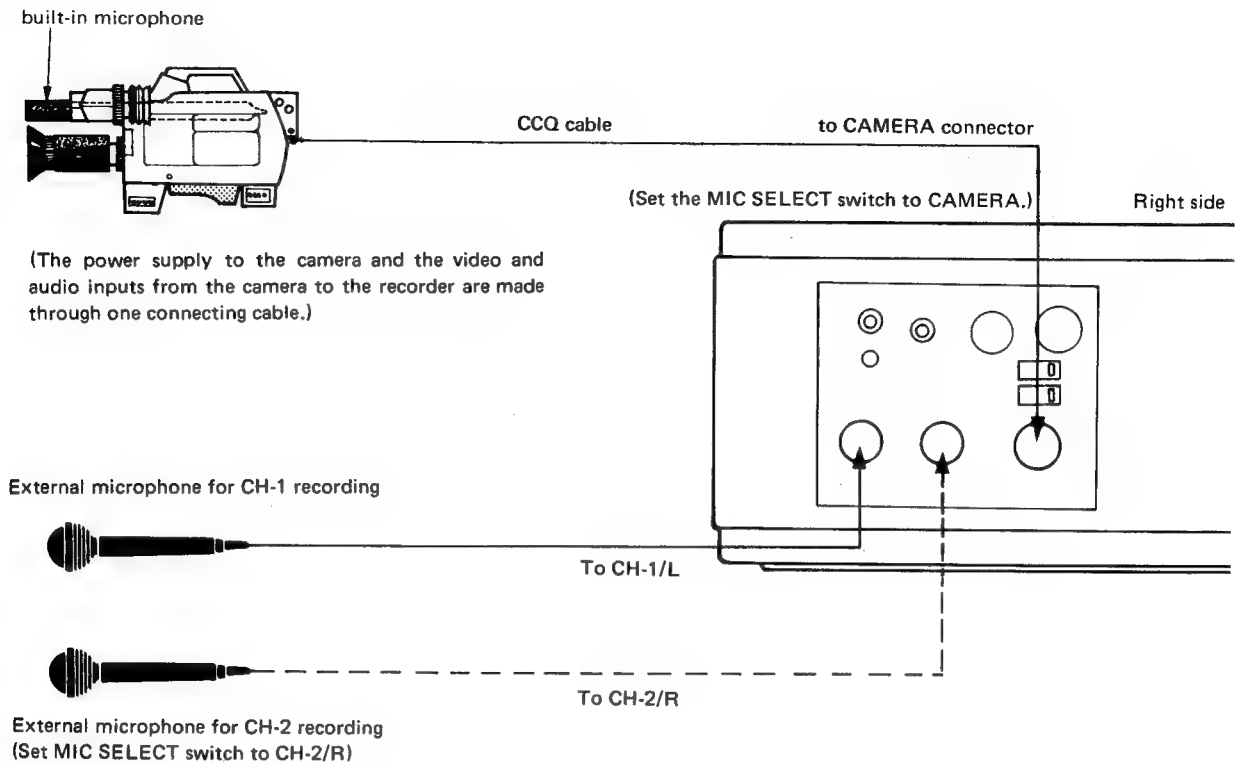


The battery pack and the AC adaptor cannot be connected simultaneously.

NOTE ON CONNECTION WITH A CAMERA NOT MADE BY SONY OPERATING ON A BATTERY

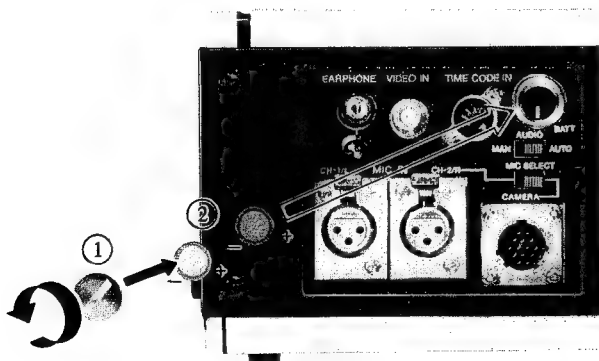
If a camera other than a Sony product operating on a battery is connected to this recorder, the battery of the recorder and that of the camera may be connected in parallel. Usually there is a potential difference between both batteries and an excess current will flow from the high-voltage battery to the low, which may cause the life of low-voltage battery to be shortened. Cut the second pin connection of the camera cable to avoid shortening the battery life. (See the figure of wiring, page 7.)

1-4-2. Signal connections



1-4-3. Memory battery loading

- ① Rotate the lid counterclockwise with a coin and remove. Replace it when the batteries have been loaded.
- ② Silver oxide or mercury batteries (2 Eveready S-76 batteries or equivalent)
Be sure to align the polarities properly.



- The memory batteries will normally last for about a year. When the batteries have been used for a long time and the time counter starts to display a random set of digits, this means that it is time to replace the batteries.
- Even if the memory batteries are not loaded, the time counter still functions normally when the power is switched on.

1-5. OPERATION

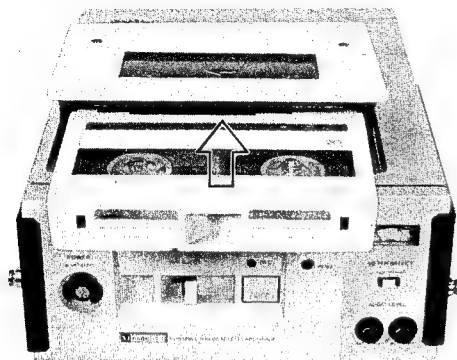
1-5-1. Operation procedure

1) Switch power on.

Switch the power on. The digital time counter lights and power is also supplied to the camera.

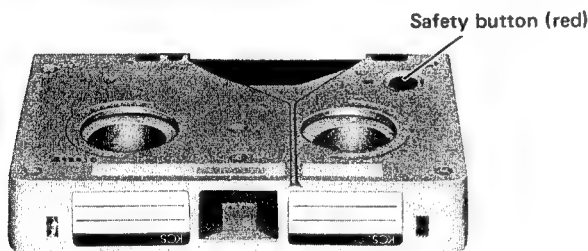
2) Load cassette.

The cassette compartment rises when the EJECT button is moved in the direction of the arrow (left). Load the cassette in the direction indicated in the figure.



The tape is loaded and the recorder is set to the standby mode when the cassette compartment lid is closed.

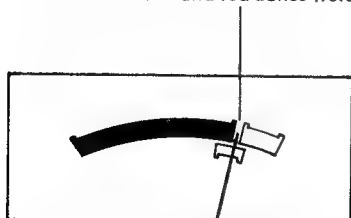
- Before cassette insertion, check that the red safety button on the rear has not been removed. The VTR will not work if this button is missing.



3) Adjust recording level.

Set the AUDIO AUTO/MAN select switch to AUTO to record the sound automatically. To adjust manually, set the switch to MAN and set the METER SELECT switch to AUDIO. Adjust the audio control(s) so that the needle of the level meter indicates a reading between the black and red zones.

0 dB between black and red zones (reference level)



4) Start recording

Depress the REC button on the recorder or the START switch on the camera to start recording. The REC lamp will blink to indicate that recording is now taking place.

- During recording the tally lamp inside the camera viewfinder lights.

5) Finish recording

Depress the REC button on the recorder or the START switch on the camera again to stop recording. The REC lamp will go off and the recorder will be returned to the standby mode.

- Depress the camera's START switch again if the recording was started by using this switch. The tape will not stop running if the REC button is depressed.
- The next shot will be recorded immediately if the recorder is set to the standby mode. The scenes are composed without any irregularities between shots. If, however, the interval between shots is less than one second, smooth picture transition cannot be guaranteed.
- For prolonged standby, switch off the power. This action helps to protect both the video heads and the tape, and it also saves wear on the batteries. The tape will now be rewound inside the cassette (unloading) and the power will be switched off.
- Monitor the recording picture directly through the camera's viewfinder.
- Monochrome cameras which do not generate equalizing pulses in their sync signals cannot be connected and used with this recorder.

Notice on moisture condensation

Moisture may condense on the drum assembly inside the machine if the recorder is moved directly from a cold to a warm location. This may cause the tape to adhere to the head drum. To prevent the tape from possible damage, do not insert a cassette if the HUMID lamp lights when the POWER switch is depressed (ON). Wait until the lamp goes off.

If the HUMID lamp lights while the TAPE END or the BATTERY lamp lights up, do not eject the cassette. Wait until the lamp goes off. If the HUMID lamp lights during record, standby, long pause or power saving mode, eject the cassette and wait until the lamp goes off.

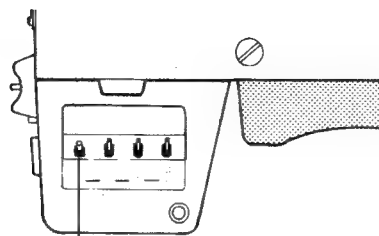
NOTE ON LONG PAUSE

About 8 minutes after the recorder is set to the standby or the power saving mode, the recorder enters the long pause mode. In the long pause mode, the tape slackens around the rotating head drum in order to prevent the tape and video heads from damage and clogging. Smooth picture transition cannot be guaranteed if the scenes are assembled with this mode.

1-5-2. Power saving

Power consumption will be automatically reduced to 6 W while video signals are not being supplied to the recorder, if the power saving switch on the camera is activated.

On the BVP-300P camera, the CAMERA/VTR switch serves as the power saving switch. For details, refer to the instruction manual of the camera.



CAMERA/VTR switch

In the power saving mode, the rotational speed of the head drum drops, all the video amplifier circuitry is cut off and power is saved. However, it is possible to monitor the camera output signal through the viewfinder on the camera.

- The audio amplifier circuitry functions as usual. It is possible to adjust the audio recording level and monitor the sound through the earphone in the power saving mode.

When the REC button is depressed in the power saving mode, it will take about 6 seconds for the servo to lock. The SERVO lamp and the tally lamp in the camera blink during this interval. When the recorder is set to the recording mode, the tally lamp lights up.

1-5-3. Warning system

The WARNING lamps, earphone and camera tally lamps serve to advise the operator of the following operational states.

WARNING lamps			EARPHONE tone, 1 kHz (interval)	VTR operation	Camera tally lamps		
Lamp	(State)	Operation (interval)			REC tally (top)		BATT tally* (bottom)
RF	(Something wrong with video recording system)	Blinks (0.25 sec)	Yes (0.25 sec)	Continues	Blinks (0.25 sec)		
SERVO	(Irregularity in servo)	Blinks (0.25 sec)	Yes (0.25 sec)	Continues	Blinks (0.25 sec)		
HUMID (Condensation on head drum.)	(Cassette in)	Lights up	Yes (0.25 sec)	Continues	Blinks (0.25 sec)		
	(No cassette)	Lights up	No	Stops			
SLACK	(Tape slack)	Blinks (0.25 sec)	Yes (continuously)	Stops	Blinks (0.25 sec)		
TAPE END	(Before end)**	Blinks (1 sec)	Yes (1 sec)	Continues	Blinks (1 sec)		
	(End of tape)	Lights up	Yes (continuously)	Stops	Blinks (0.25 sec)		
BATTERY (Battery wear)	(Before end)**	Blinks (1 sec)	Yes (1 sec)	Continues	Blinks (1 sec)		Blinks (1 sec)
	(Discharge)	Lights up	Yes (continuously)	Stops	Blinks (0.25 sec)		Lights up

* The BATT tally lamp functions when the VTR's battery pack or the camera's battery pack are worn out.

** Slow (1-second interval) blink of the lamps indicates that the tape running will be stopped after a few minutes.

Proceed as follows when a lamp is blinking or has come on, or when the warning tone is heard.

- **RF lamp**
Check the cables for poor connections. If this does not remove the cause of the trouble, clean the heads. (Refer to page 13)
- **SERVO lamp**
Check to confirm that the CAMERA connector and the VIDEO IN connector have not been connected simultaneously.
- **HUMID lamp**
Before inserting a cassette into the machine, check that the HUMID lamp does not light when the POWER switch is pushed to ON. If the cassette is inserted with the lamp lit, the tape may adhere to the head drum. Transfer the machine to a dry location and wait until the lamp does not light

when power is reapplied. If the lamp lights during operation, an improper tape motion may be experienced inside the machine.

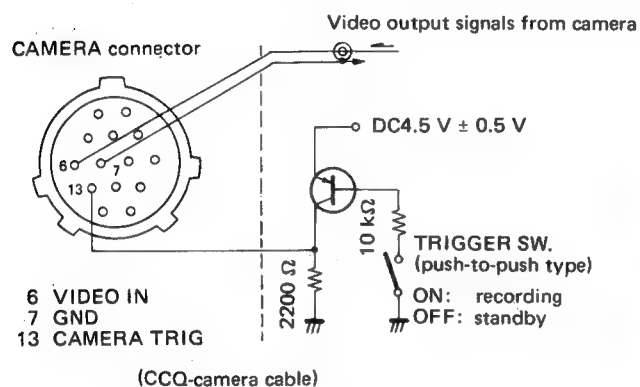
- **SLACK lamp**
Depress the POWER switch to turn off the recorder. Remove the cassette manually referring to the Section 2 "Maintenance Manual."

Note: Do not operate the EJECT button if the tape does not unthread completely into the cassette, which may damage the tape.

1-5-4. Starting and stopping with ordinary cameras

When a camera not equipped with a CCQ cable is used, recording can be started and stopped by making either of these two connections:

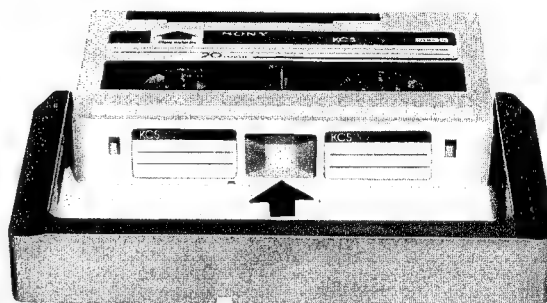
- Connect to the VIDEO IN connector (BNC).
Recording starts when a video input signal is supplied and stops when the signal is cut off.
- Connect to the 14-pin camera connector using this circuit:



1-6. VIDEOCASSETTE TAPES

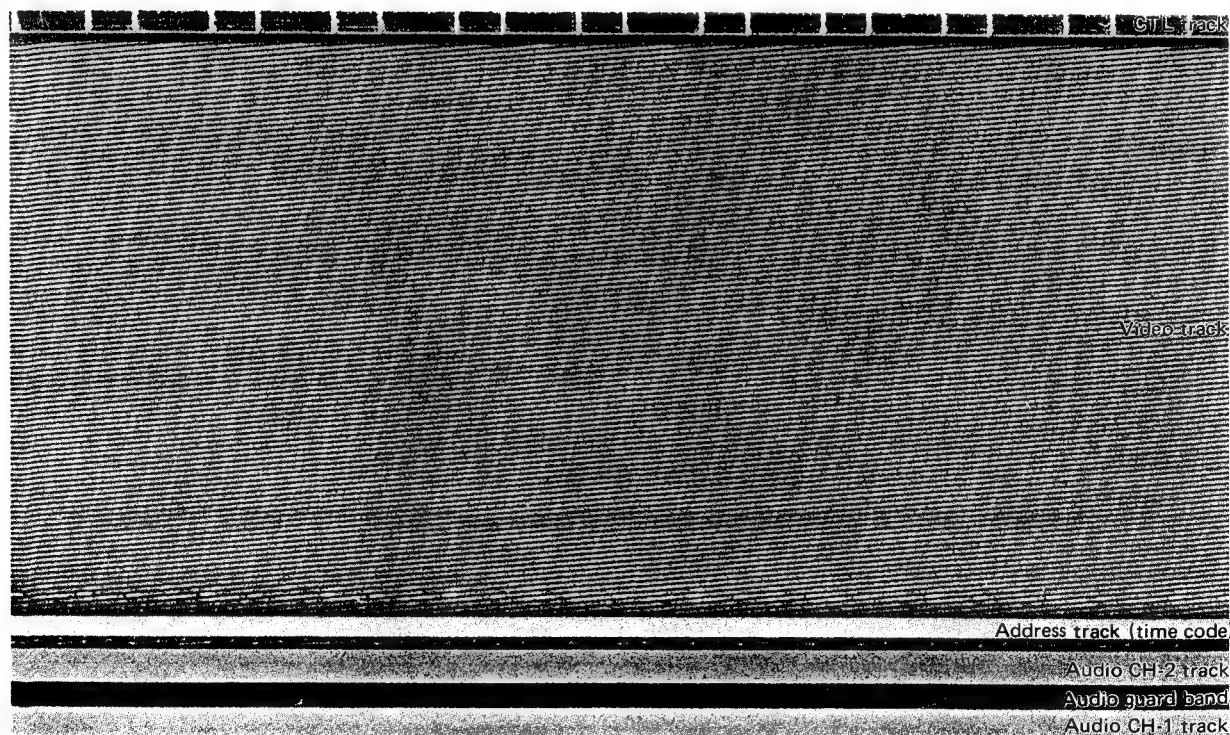
Use the Sony compact U-matic **[S]** videocassette tapes such as KCS-20BR (20 min.) and KCS-10BR (10 min.) or equivalent. The small round red button on the underside of the cassette should not be removed if it is desired to record on the cassette. Remove this safety button to protect against accidental erasure.

These videocassettes are smaller than regular U-matic cassettes although their tape patterns and reel spacings are the same. They can, therefore, be interchanged. When inserting these cassettes into the electronic editing machines (BVU-200P) that use regular U-matic cassettes, align the guide grooves of the rear surface with the projections of the editing machine and insert carefully. For positive loading, use cassette adaptor model KA-1 (optional).



U-matic **[S]** videocassette + cassette adaptor KA-1

The figure below shows the tape pattern recorded on the recorder. The EBU time code address track which is recorded from the external time code generator is depth recorded. This is why the picture may be unstable with cassettes having EBU time code recordings which are loaded into U-matic H VTRs available on the market. The BVU-100P and BVU-200P were expressly designed to playback these time code recordings.



1-7. CLEANING THE HEADS

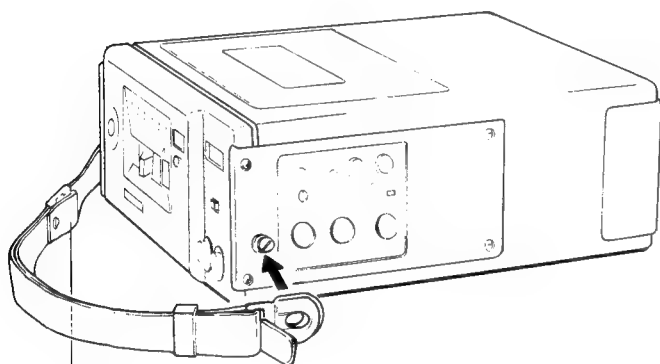
Use the KCS-1C cleaning cassette to clean the video and audio heads.

Insert a cleaning cassette into the cassette compartment as you would an ordinary videocassette. Set the machine to the record mode and the heads will then be cleaned. The cassette may be re-wound and used again four or five times.

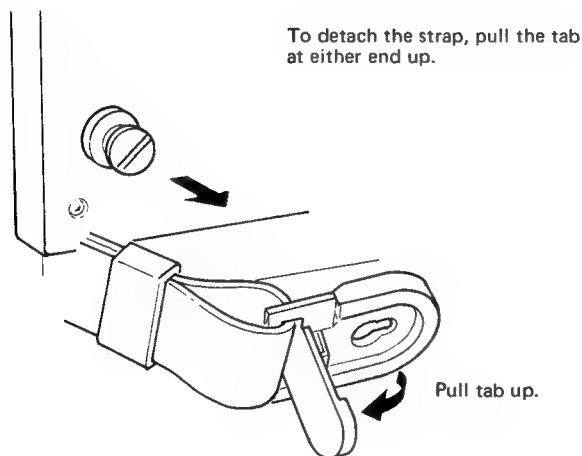
Note: The STOP button should be depressed before the digital time counter indicates 30 SEC. Excessive use of the cassette may shorten the head life.

1-8. SHOULDER STRAP

The supplied shoulder strap can be attached to the VTR as shown below.

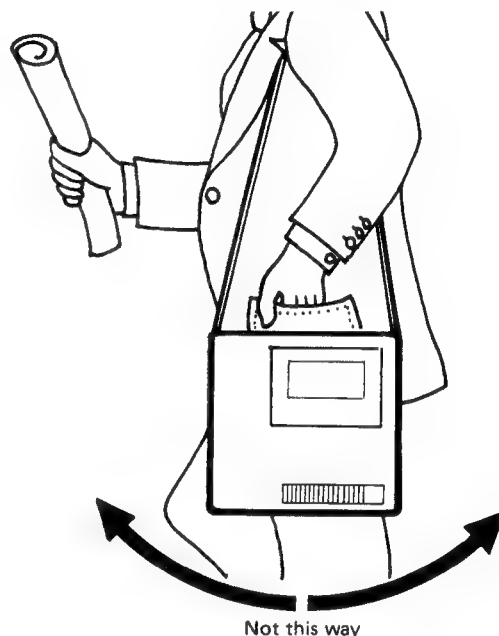


Adjust the length



1-9. PRECAUTIONS FOR USE

- Do not use the machine in extremely hot or cold locations or in places where the humidity is high. The main unit is designed to operate in temperatures ranging from 0°C to 40°C. Avoid sudden temperature changes, particularly from an extremely cold location to a warm one, as this is conducive to condensation of moisture on the head drum assembly. (See HUMID lamp on page 11.)
- Do not subject the machine to unnecessary vibration. When carrying the machine vertically, do not swing it in the direction shown by the arrows in the illustration.



- Avoid dusty locations.
- After using the machine, leave the batteries to discharge (battery under cut at 10.8 V) and then store. The life of the batteries will be affected if they are left to discharge completely with the POWER switch is accidentally left on.

Auxiliary functions

Function memory

The tape is loaded when the cassette is installed and the tape comes into contact with the head drum. It takes about 5 seconds for the tape to be loaded.

The function memory is designed to allow the REC button to be depressed while the tape is being loaded so that the machine will be set to the record mode as soon as the loading operation is completed.

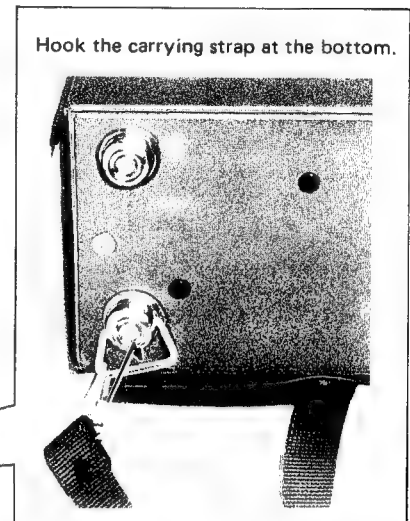
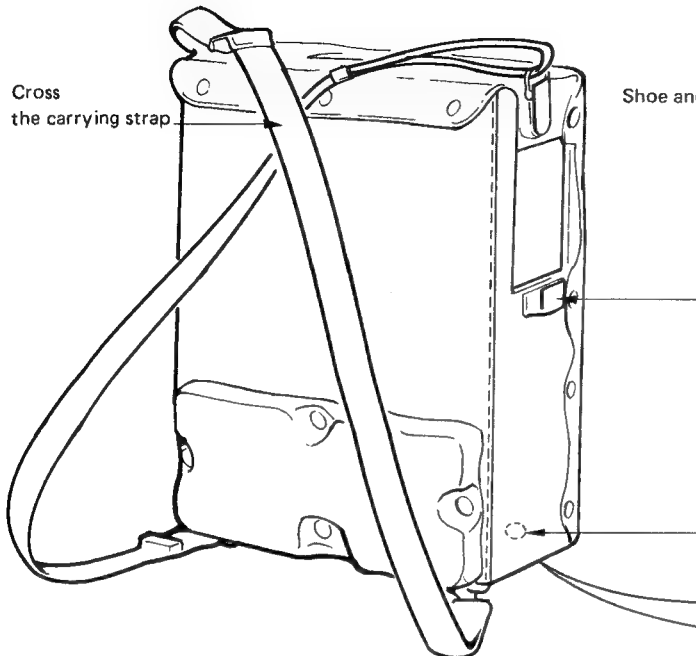
Auto stop

This mechanism automatically shuts off the VTR at tape-end. It also works when the rated battery voltage falls below the rated value during recording.

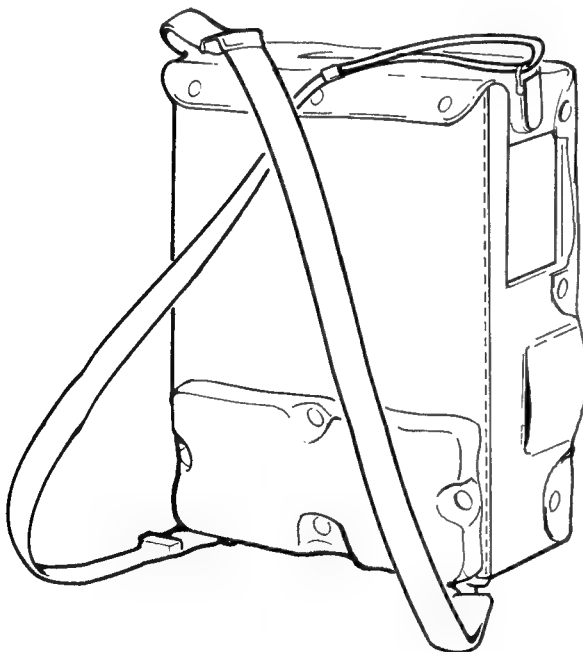
1-10. CARRYING CASE

With the supplied carrying case and carrying straps, the machine can be carried and operated on the operator's back.

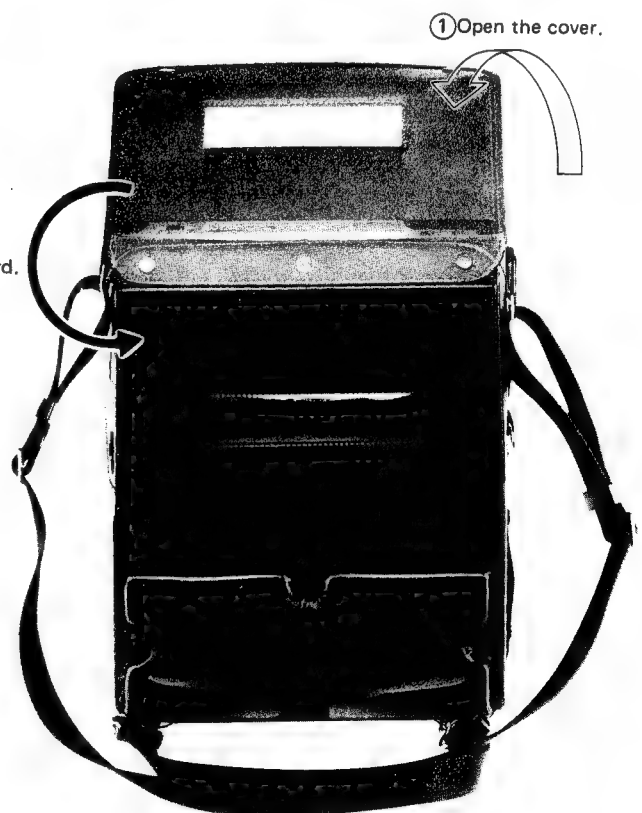
Serial No. 10625 or less



Serial No. 10626 or more



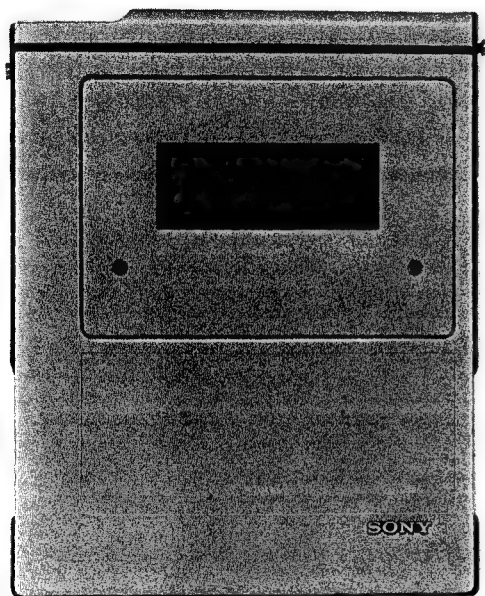
② Turn it downward.



SONY

TRAGBARER VIDEO-CASSETTEN-RECORDER

BVU-50P



Professional **U-maticHS**

BEDIENUNGS- UND WARTUNGSANLEITUNG

ABSCHNITT 1

BEDIENUNG

Dieser Videocassetten-Recorder ist ein vielseitiges Gerät, das sich durch einfachste Bedienung und kompakte Ausführung auszeichnet, so daß immerwährende Aufnahmebereitschaft gewährleistet ist. Speziell für den Reporterdienst entwickelt können die Eigenschaften dieses Gerätes optimal genutzt werden, wenn es in Verbindung mit einer tragbaren SONY Farb-Videokamera (ausgerüstet mit 14-poligem CCQ-Kamerakabel) verwendet wird.

1-1. MERKMALE

Kompakte Ausführung, leicht im Gewicht

Dieser Recorder wiegt einschließlich Batterien, Schultergurt und Cassette nur 7,9 kg. Das Gerät selbst hat ein Gewicht von nur 5,7 kg.

Geringste Leistungsaufnahme

Die Schaltkreise wurden nur für Aufnahmebetrieb bei geringstem Stromverbrauch ausgelegt, wodurch sich eine Leistungsaufnahme von nur 12 W ergibt.

Sparbetrieb

Auf Sparbetrieb geschaltet beträgt die Leistungsaufnahme dieses Gerätes nur 6 W.

Ausgezeichnete Bildqualität

Da dieser Recorder dem U-matic H (High Band) Standard entspricht, gewährleistet er trotz seiner kompakten Ausführung eine Bildqualität, die mit der eines U-matic H Video-Aufzeichnungsgerätes (z.B. Modell BVU-200P/S) für Fernsehstationen vergleichbar ist.

Glatte Szenenübergänge

Videocassetten-Programme können ohne Bildfehler an den Szenenübergängen aufgezeichnet werden. Die Vertikalintervall-Zeitsteuerung bürgt in Verbindung mit der Schneidepunkt-Stabilisierungsfunktion für sauberste Bandschnitte.

Echtzeitzählwerk

Eine LED-Anzeige zeigt die Echtzeit bei Aufnahmevorgängen an. Auch wenn die Stromversorgung abgeschaltet, die Hauptbatterie herausgenommen bzw. erschöpft ist, bleibt der Inhalt der Anzeige gespeichert.

Automatische oder manuelle Bandmitschnitte

Bei Bildaufzeichnungen können die Tonsignale entweder manuell (Begrenzeraufnahme) oder automatisch angesteuert werden.

Kontrollampen

Die Kontrollampen RF, SERVO, HUMID, SLACK, TAPE END und BATTERY geben dem Kameramann jederzeit über den Betriebszustand des Recorders Auskunft. Über den Ohrhörer ist gleichzeitig ein akustisches Signal hörbar.

Bandende-Vorwarnung

Während der letzten Minuten eines Magnetbands blinkt die TAPE END Kontrollampe, um anzuzeigen, daß bald das Ende des Magnetbandes erreicht ist. Am Bandende schaltet sich der Bandtransport automatisch ab, und die Kontrollampe leuchtet stetig. Auf die gleiche Weise zeigt die BATTERY Kontrollampe an, daß die Spannung der Batterie unter die Nennspannung abgesunken ist, und der Bandtransport in einigen Minuten abgeschaltet wird.

Zeitcodeaufnahme

Bei Anschluß eines Zeitcode-Generators BVG-100PS an den Recorder kann der EBU-Zeitcode auf Band aufgezeichnet werden.

Regelbarer Ohrhörer-Lautstärkepegel

Der Ohrhörer-Lautstärkepegel kann in einem Bereich von -20 bis zu -32 dB eingestellt werden.

Kameraanschluß mit nur einem Kabel


Durch den Anschluß einer Farb-Videokamera mit Hilfe eines einzigen 14-poligen CCQ-Kamerakabels an diesen Recorder sind alle Verbindungen für die Stromversorgung und für die Signalaufzeichnung hergestellt.

Lange Aufnahmepausen

Bleibt das Gerät für länger als ca. 8 Minuten auf Pausenfunktion geschaltet, dann schaltet der Recorder automatisch auf die Betriebsart „lange Pause“ um das Magnetband und die Bildköpfe nicht unnötig zu belasten.

1-2. TECHNISCHE DATEN

Mechanische Bauteile

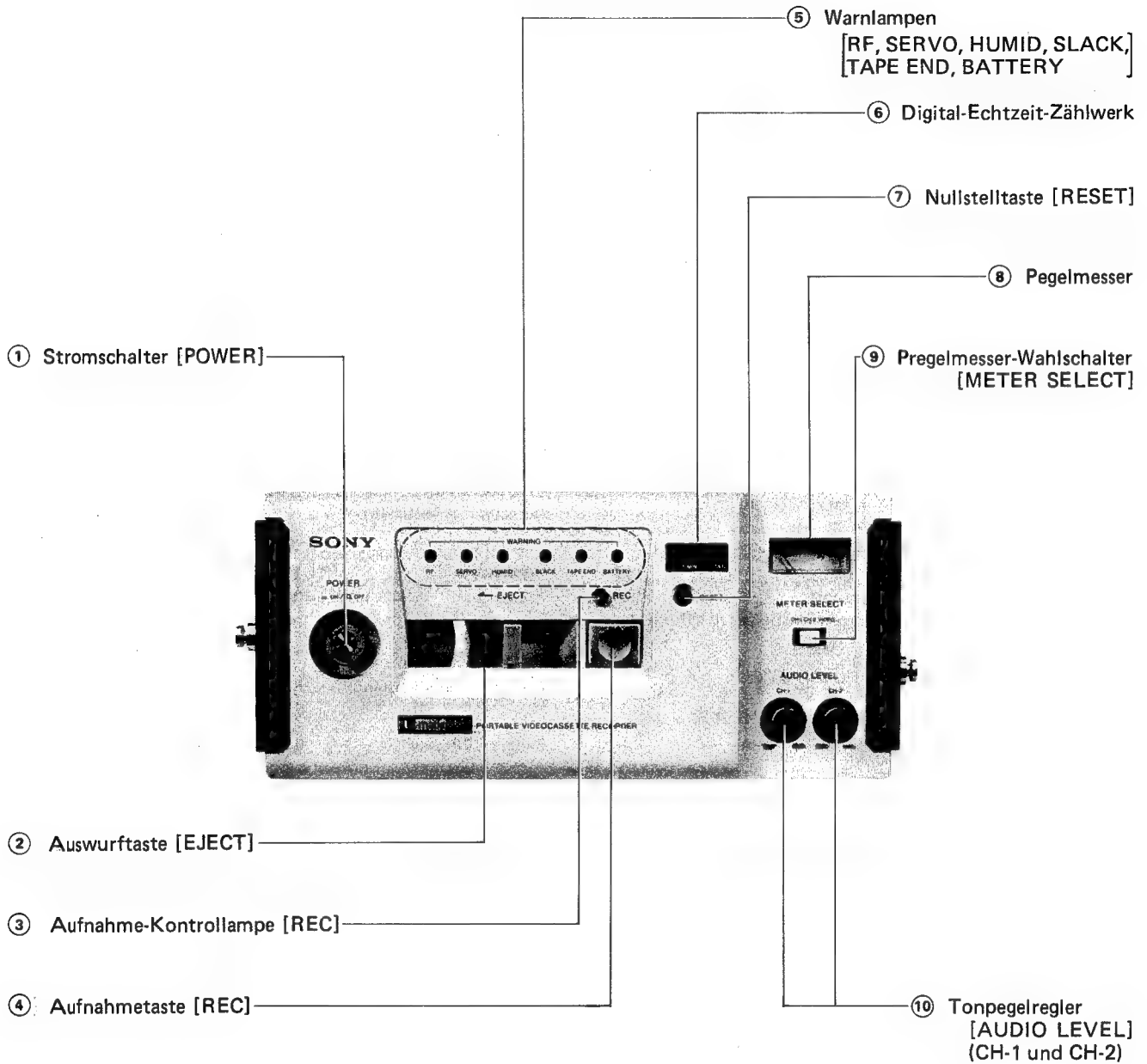
Gewicht	Haupteinheit: 5,7 kg Schultergurt: 0,2 kg BP-90 Batteriepack: 1,7 kg KCS-20BR Videocassette: 0,3 kg
Abmessungen (BxHxT)	270 x 125 x 335 mm
Videocassetten	U-matic  KCS (3/4-Zoll-Cassetten)
Magnetband-Kompatibilität	Verwendbar mit U-matic H Videocassetten-Recorder
Bandgeschwindigkeit	9,53 cm/s
Gleichlaufschwankungen	0,2% (Mittelwert) } (mit Standard- ±0,2% (DIN) } Wiedergabegerät)
Aufnahmedauer (Stromversorgung)	260 min. nur mit Modell BVU-50P (bei voll aufgeladenem Batteriepack BP-90) 70 min. bei Stromversorgung auch der Kamera (BVP-300P)
Aufnahmedauer (Videocassette)	max. 20 min. (mit Videocassette KCS-20BR)
Anschlüsse	
CAMERA	14-poliger Anschluß (für CCQ-Kabel)
VIDEO IN	BNC-Anschluß
TIME CODE IN	5-poliger DIN-Anschluß
MIC IN CH1/L, CH2/R	XLR-Buchse
EARPHONE	Mini-Buchse
Zul. Betriebstemperatur	0°C bis +40°C
Zul. Luftfeuchtigkeit	weniger als 85% (relative Luftfeuchtigkeit)
Zul. Lagertemperatur	-20°C bis +60°C
Betriebsposition	Horizontal oder vertikal

Elektrische Bauteile

Stromversorgung	Batteriepack BP-90 (Gleichspannung 12V ± 2 V; Nickel-Kadmium 3,5 Ah) Netzgerät AC-500CE (Sonderzubehör)
Leistungsaufnahme	12 W (12 V, 1 A) 6 W (Sparbetrieb)
Video	
Aufnahmesystem	Helle: FM Farbsättigung: SC-Niederbereich-Umwandlung
Eingang	PAL-Bildaustast synchron-Signal, negative Vorspannung 1,0 V ± 6 dB, 75 Ohm, asymmetrisch
Horizontalauflösung	260 Zeilen für Farbbilder (mit Standard-Wiedergabegerät)
Signal-Rauschabstand	Besser als 46 dB für Farbsignale (mit Standard-Wiedergabegerät)
Audio	
Eingang (MIC)	-60 dB, 3 kOhm, symmetrisch (für Mikrofone mit 600 Ohm Impedanz)
Ausgang (EARPHONE)	-20 dB bis -32 dB einstellbar (für Ohrhörer mit 8 Ohm Impedanz)
Frequenzgang	50 Hz bis 15 kHz (mit Standard-Wiedergabegerät)
Klirrfaktor	Weniger als 2,5% (1 kHz Bezugspegel, Standard-Wiedergabegerät)
Fremdspannungsabstand	Besser als 48 dB (3% Klirr, mit Standard-Wiedergabegerät)
Zeitcode-Eingang	0dB \pm 6dB, 10 kOhm, asymmetrisch
Mitgeliefertes Zubehör	Tragetasche Schultergurt Trageriemen Zeitcode-Generatorgehäuse (für BVG-100PS) Zeitcode-Generatorkonsole
Andere Ausrüstung und Sonderzubehör	Batteriepack BP-90 (Nickel-Kadmium-Batterien, 3,5 Ah) Batterie-Ladegerät BC-210CE Netzgerät AC-500CE Zeitcode-Generator BVG-100PS Ohrhörer ME-20B Silberoxid- und Quecksilberbatterien (Eveready S-76 oder ähnlich)

1-3. ANORDNUNG DER BEDIENTUNGSELEMENTE

1-3-1. Reglerfeld



① **Stromschalter [POWER]**

Zum Einschalten des Recorders hier drücken. Das Magnetband wird aus der Cassette gezogen und um die Bildkopftrommel gefädelt. Gleichzeitig wird die Stromversorgung der evtl. angeschlossenen Kamera eingeschaltet, auch wenn der Cassettenschacht ausgefahren ist. Um den Recorder abzuschalten, nochmals drücken, wodurch das Magnetband ausgefädelt und der Bandtransport abgeschaltet wird.

Die Digital-Echtzeitanzeige ⑥ leuchtet bei eingeschalteter Stromversorgung auf und dient daher als Kontrolllampe für die Stromversorgung.

② **Auswurfaste [EJECT]**

Diese Taste in Pfeilrichtung (links) schieben, um den Cassettenschacht anzuheben; die Videocassette kann nun eingesetzt bzw. herausgenommen werden. Wird die Cassette bei eingeschalteter Stromversorgung eingesetzt, dann wird das Magnetband eingefädelt, und der Recorder schaltet auf Bereitschaft. Wird diese Taste betätigt, um die Cassette herauszunehmen, dann wird zuerst das Magnetband in die Cassette zurückgespult, wonach der Cassettenschacht ausfährt.

③ **Aufnahme-Kontrollampe [REC]**

④ **Aufnahmetaste [REC]**

Diese Taste drücken, um mit der Aufnahme zu beginnen; gleichzeitig beginnt die REC-Lampe ③ zu blinken. Um den Recorder wieder auf die Bereitschaftsfunktion zu schalten, diese Taste nochmals betätigen. Der Bandtransport wird abgeschaltet, und die REC-Lampe erlischt.

- Während der Bereitschaftsfunktion befindet sich das Magnetband in engem Kontakt mit der noch rotierenden Bildkopftrommel. Bei längeren Wartezeiten zwischen den einzelnen Aufnahmen sollte daher der Stromschalter abgeschaltet werden, um Verschmutzung der Bildköpfe zu vermeiden.

⑤ **Warnlampen [WARNING]**

Diese Lampen zeigen den Betriebszustand des Videocassetten-Recorders an.

RF-Lampe

Diese Lampe blinkt, wenn die Bildköpfe verschmutzt sind, oder wenn aufgrund einer Störung des Aufnahmeschaltkreises keine Aufnahme möglich ist. Neben den Aufnahmeköpfen ist Modell BVU-50 mit einem HF-Wiedergabekopf ausgerüstet; dieser stellt in Verbindung mit dieser Warnlampe fest, ob die Vertikal-Synchronsignale wiedergegeben werden oder nicht.

SERVO-Lampe

Diese Lampe blinkt, wenn der Bildtrommel-Servo nicht synchronisiert ist.

HUMID-Lampe

Leuchtet auf, wenn sich Kondensat auf der Bildkopftrommel gebildet hat bzw. bildet.

SLACK-Lampe

Diese Lampe blinkt auf, wenn das Band auf der Aufwickelseite (von der Antriebswelle zur Aufwickelspule) nicht straff ist. Gleichzeitig wird der Bandtransport automatisch abgeschaltet, um zu verhindern, daß sich das Magnetband im Bandlaufwerk verwickelt.

TAPE END Lampe

Diese Lampe beginnt einige Minuten vor Bandende zu blinken (ca. 1,5 Minuten bei Verwendung der Videocassette Sony KCS-20BR, ansonsten je nach verwendetem Cassettyp variierend). Wenn das Bandende erreicht ist, leuchtet diese Lampe stetig und das Bandlaufwerk wird automatisch abgeschaltet.

BATTERY-Lampe

Diese Lampe beginnt zu blinken, wenn die Versorgungsspannung des Batteriepacks BP-90 auf weniger als 11 V absinkt (Batterien fast leer). Fällt die Spannung auf unter 10,8 V ab, dann leuchtet diese Lampe stetig, und das Bandlaufwerk wird automatisch abgeschaltet.

⑥ **Digital-Echtzeit-Zählwerk**

Dieses Zählwerk zeigt die Aufnahmedauer in Minuten [MIN] und Sekunden [SEC] an. Auch bei abgeschalteter Stromversorgung der Haupteinheit bleibt die Zählwerksanzeige erhalten, da der Speicher mit einer separaten Schutz-batterie ausgerüstet ist (weitere Einzelheiten hinsichtlich der Speicher-Schutzbatterie siehe auf Seite 1-23).

- Ist keine Speicher-Schutzbatterie eingesetzt, dann kann es nach dem Einschalten des Stromschalters vorkommen, daß manche Stellen bzw. Teile der Stellen nicht angezeigt werden. In einem solchen Fall die Nullstelltaste [RESET] ⑦ drücken, um die Zählwerksanzeige auf 00 MIN 00 SEC zu stellen.

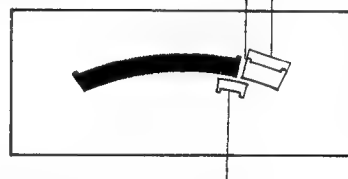
⑦ **Nullstelltaste [RESET]**

Diese Taste drücken, um die Zählwerksanzeige auf 00 MIN 00 SEC zu stellen. Normalerweise zuerst eine Cassette in das Gerät einsetzen und danach diese Taste drücken, um die Aufnahme mit Nullanzeige zu beginnen.

⑧ **Pegelmesser**

Hier wird der Pegel des mittels Pegelmesser-Wahlschalter gewählten Signals angezeigt.

Tonbezugspegel (0 dB) — Zu hoher Tonpegel (rot)



Normaler Videosignalpegel (blau)

⑨ **Pegelmesser-Wahlschalter [METER SELECT]**

Dient zur Wahl des Signals, dessen Pegel vom Pegelmesser ⑧ angezeigt werden soll. Dient auch zur Wahl des Kanals für den Ohrhörer.

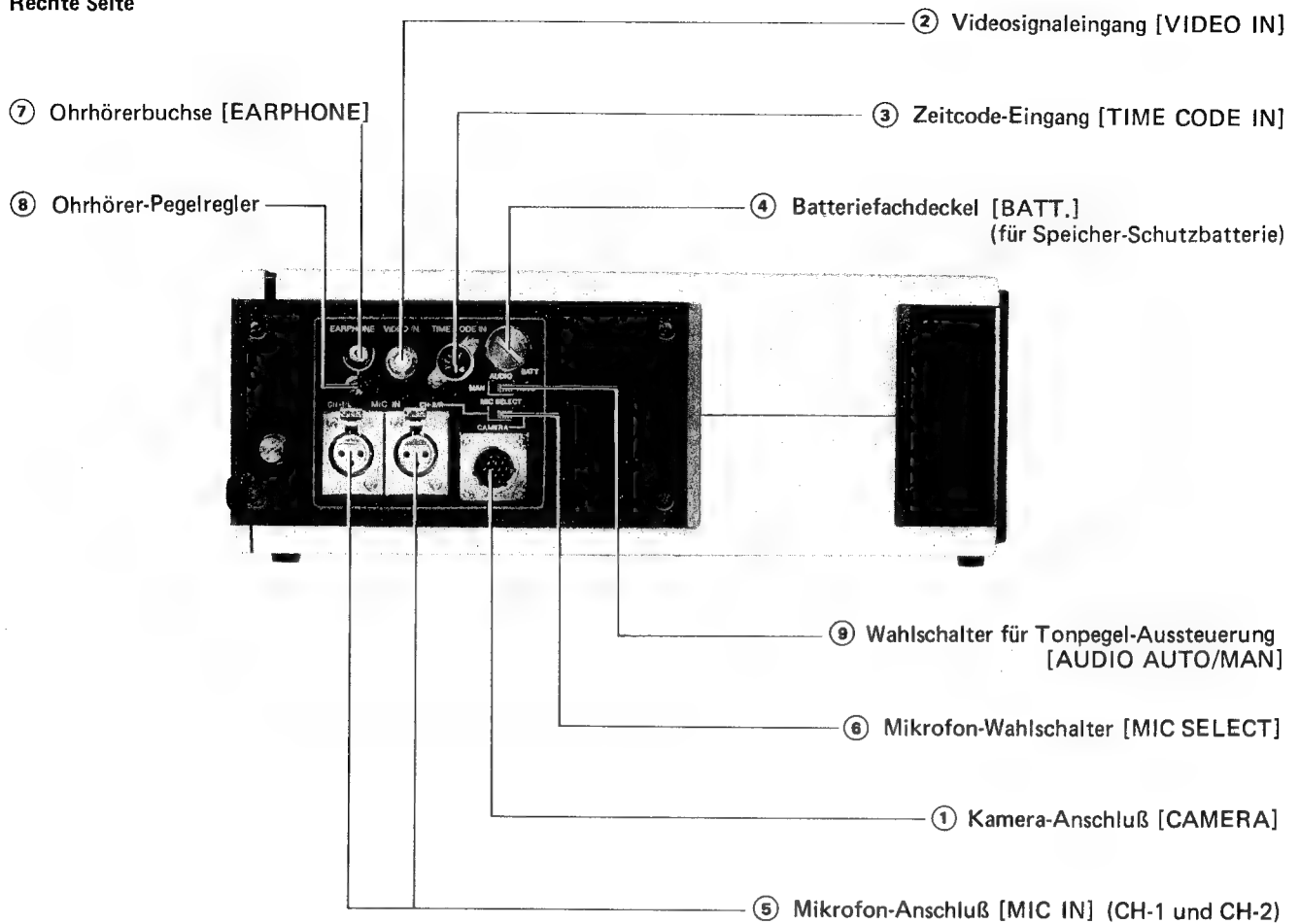
Schalterposition	Pegelmesser-Anzeige	Ohrhörer
CH-1	Aufnahmepegel für Tonkanal CH-1	CH-1
CH-2	Aufnahmepegel für Tonkanal CH-2	CH-2
VIDEO	Videosignal-Aufnahmepegel	CH-1 + CH-2 (Mix)

⑩ **Tonpegelregler [AUDIO LEVEL]**

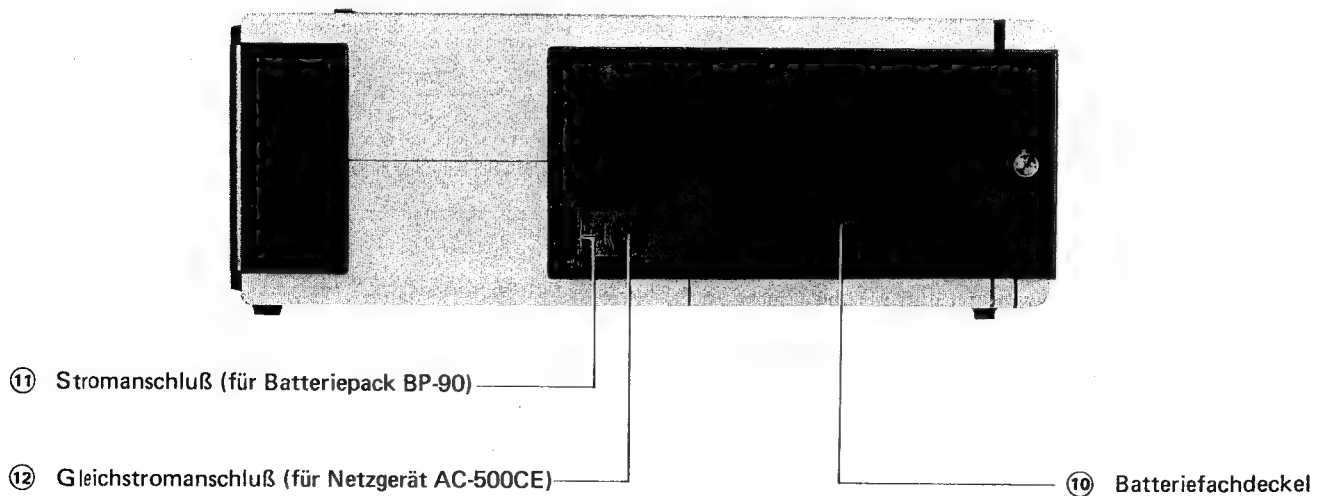
Bei auf Position MAN gestelltem AUDIO AUTO/MAN Wahlschalter (rechte Geräteseite) kann der Aufnahmepegel für Tonkanal 1/L mit dem Regler AUDIO LEVEL CH-1/L und der für Tonkanal 2/R mit dem Regler AUDIO LEVEL CH-2/R eingestellt werden.

1-3-2. Anschlußfeld

Rechte Seite



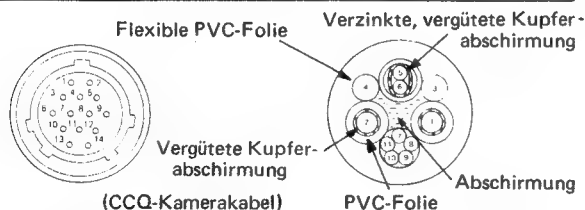
Linke Seite



① Kamera-Anschluß [CAMERA]

Hier die Ausgangssignale einer Sony Farb-Videokamera mit Hilfe eines CCQ-Kamerakabels einspeisen.

Stift-Nr.	Ader-Nr.	Bemerkungen	Farbe
1	4	DC 12V OUT (E)	Schwarz
2	3	DC 12V OUT (HOT)	
3	5	MIC IN (X)	Rot
4	6	MIC IN (Y)	Weiß
5	Abgeschirmt	MIC IN (GND)	
6	2	VIDEO IN (X)	Blau
7	2 Abgeschirmt	VIDEO IN (GND)	Blau
8			
9			
10	7	BATT, INDICATOR OUT	Schwarz
11	8		Braun
12	9	REC & ALARM SIG OUT	Rot
13	10	REC SIG IN	Orange
14	11	POWER SAVE IN & AUDIO MONITOR OUT	Gelb



② Videosignaleingang [VIDEO IN]

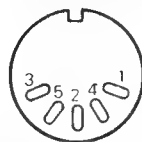
Hier die Ausgangssignale einer Farb-Videokamera (oder eines Videocassetten-Recorders) zur Aufnahme anschließen.

- Wird der VIDEO IN Eingang verwendet, dann kann der Videocassetten-Recorder nicht auf Aufnahme geschaltet werden, wenn kein Video-Eingangssignal anliegt. Der Videocassetten-Recorder kann daher durch Ein- bzw. Abschalten des Videosignals in Betrieb bzw. stillgesetzt werden (siehe Seite 1-26).
- Niemals den VIDEO IN Eingang und den CAMERA Anschluß ① gleichzeitig belegen, da ansonsten das Servo-System nicht richtig arbeitet und der Videocassetten-Recorder nicht auf Aufnahme geschaltet werden kann.

③ Zeitcode-Eingang [TIME CODE IN]

Wird der EBU-Zeitcode-Generator BVG-100PS (Sonderzubehör) oder ein gleichwertiges Gerät hier angeschlossen, dann kann der Zeitcode gleichzeitig mit dem Videosignal aufgezeichnet werden.

- Hier liegen geschaltete Videosignale an, um den Zeitcode-Generator in Betrieb zu setzen, so daß mit dem Ein- und Ausschalten des Videocassetten-Recorders synchronisierte Zeitcodesignale aufgezeichnet werden können.



(Außenansicht)

1. SW'D VIDEO
2. TC IN
3. GND (Erdung)
4. GND (Erdung)
5. GND (Erdung)

Hinweis: Geschaltete Videosignale liegen während der Aufnahme an (wenn das Bandlaufwerk arbeitet). Der Zeitcode-Generator beginnt dann zu zählen.

④ Batteriefachdeckel [BATT.]

Hier werden die Speicher-Schutzbatterien eingesetzt. Dadurch bleiben die angezeigten Stellen des Bandzählwerkes erhalten, wenn die Stromversorgung abgeschaltet oder die Hauptbatterie zum Auswechseln herausgenommen wird (Einzelheiten auf Seite 23).

⑤ Mikrofon-Anschluß [MIC IN] (CH-1/L und CH-2/R)

Zwei Mikrofone niedriger Impedanz (600 Ohm) mit Hilfe eines Cannon-Steckers hier anschließen.

⑥ Mikrofon-Wahlschalter [MIC SELECT]

Diesen Schalter zur Wahl der Toneingangssignale für CH-2/R wie folgt benutzen:

CAMERA: Für Aufnahmen mittels CCQ-Kamerakabel; die Signale vom Mikrofon der Kamera werden eingespeist.

CH-2/R: Für Aufnahmen von einem an CH-2/R des MIC IN Anschlusses ⑤ angeschlossenen Mikrofon.

⑦ Ohrhörerbuchse [EARPHONE]

Das Tonsignal kann während der Aufnahme überwacht werden, indem hier ein Ohrhörer mit einer Impedanz von 8 Ohm (z.B. Sony ME-20B) angeschlossen wird. Mit Hilfe des METER SELECT Schalters (siehe Seite 19) kann zwischen den Signalen von CH-1, CH-2 und CH-1 + CH-2 (MIX) gewählt werden.

Falls eine der Warnleuchten blinkt oder aufleuchtet, ist im Ohrhörer ein 1-kHz-Ton zu hören (Einzelheiten auf Seite 25).

⑧ Ohrhörer-Pegelregler

Mit diesem Regler kann der Ohrhörerpegel in einem Bereich von -20 dB bis zu -32 dB eingestellt werden.

⑨ Wahlschalter für Tonpegel-Aussteuerung [AUDIO AUTO/MAN]

Zur Wahl zwischen manuelles und automatischer Aussteuerung des Audio-Aufnahmepegels.

⑩ Batteriefachdeckel

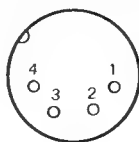
Hier wird das Batteriepack BP-90 eingesetzt (Einzelheiten auf Seite 22).

⑪ Batterieanschluß (für Batteriepack BP-90)

Das Kabel des Batteriepacks BP-90 an diese 1-polige Buchse (linke Seite) anschließen.

⑫ Gleichstromanschluß [DC IN] (für Netzgerät AC-500CE)

Das Gleichstromkabel des Netzgerätes (AC-500CE) an diesen 4-poligen XLR-Anschluß anschließen.



(Außenansicht)

1. GND (Erdung)
2. +12V
3. GND (Erdung)
4. +12V

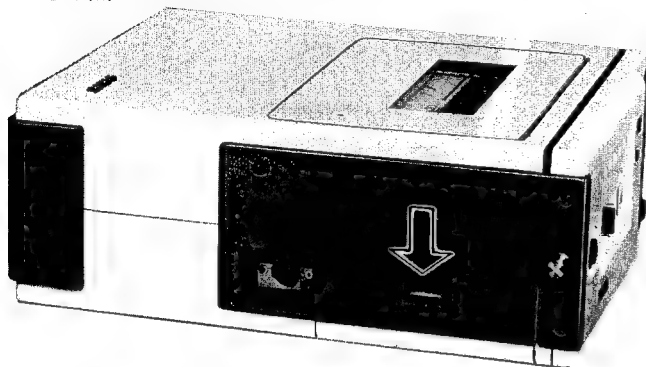
1-4. ANSCHLÜSSE

1-4-1. Anschlüsse für die Stromversorgung

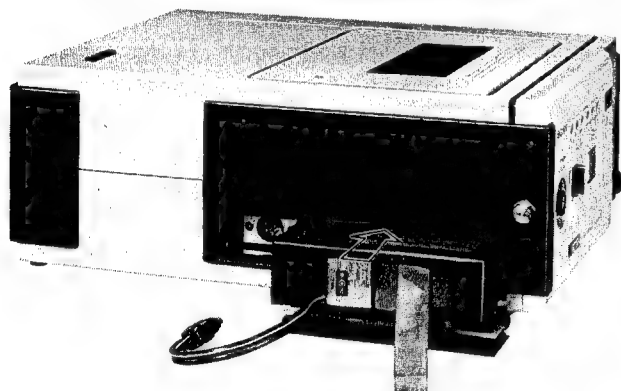
Batteriebetrieb

Das voll aufgeladene Batteriepack BP-90 wie folgt in das Gerät einsetzen.

- 1) Den in der Mitte des Batteriefachdeckels angebrachten Knopf in Pfeilrichtung nach unten ziehen und den Batteriefachdeckel öffnen.



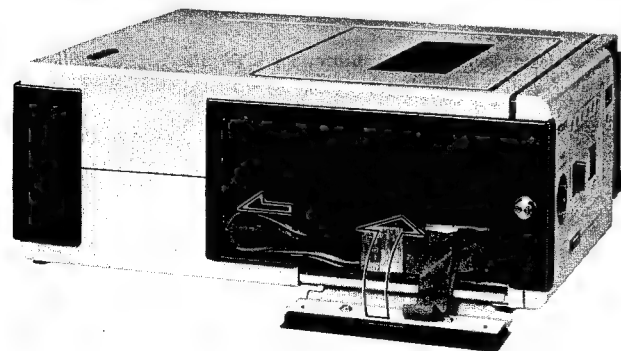
- 2) Das Batteriepack BP-90 (Sonderzubehör) wie angezeigt einsetzen.



- Nur ein Sony Batteriepack verwenden, da bei anderen Herstellern die Polarität des Batteriesteckers verschieden sein könnte.

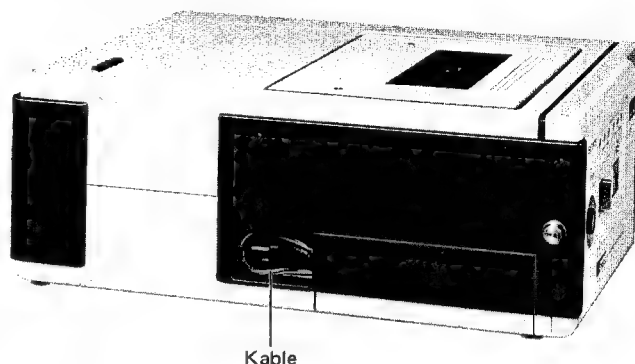


- 3) Das Kable des BP-90 an die Batteriebuchse (an der linken Seite) anschließen und das Kable wie angezeigt aufbewahren.



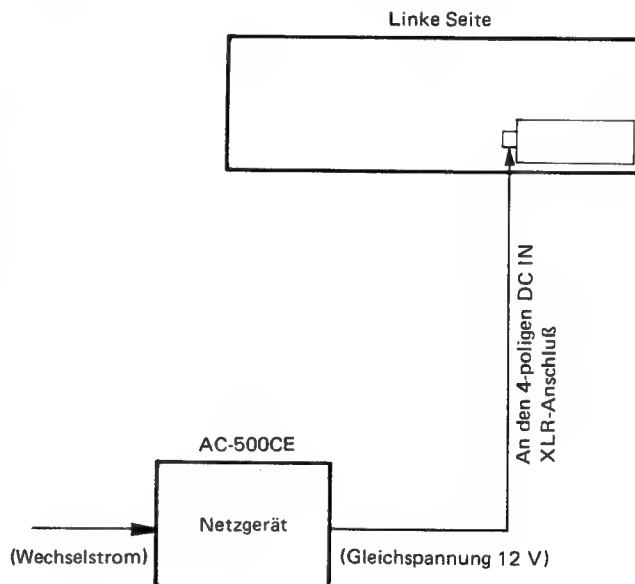
Batteriefachdeckels wieder schließen.

- 4) Den Deckel wieder anbringen und schließen.



Netzbetrieb (mittels Netzgerät)

Für den Betrieb mittels Netzgerät die Anschlüsse wie folgt vornehmen.

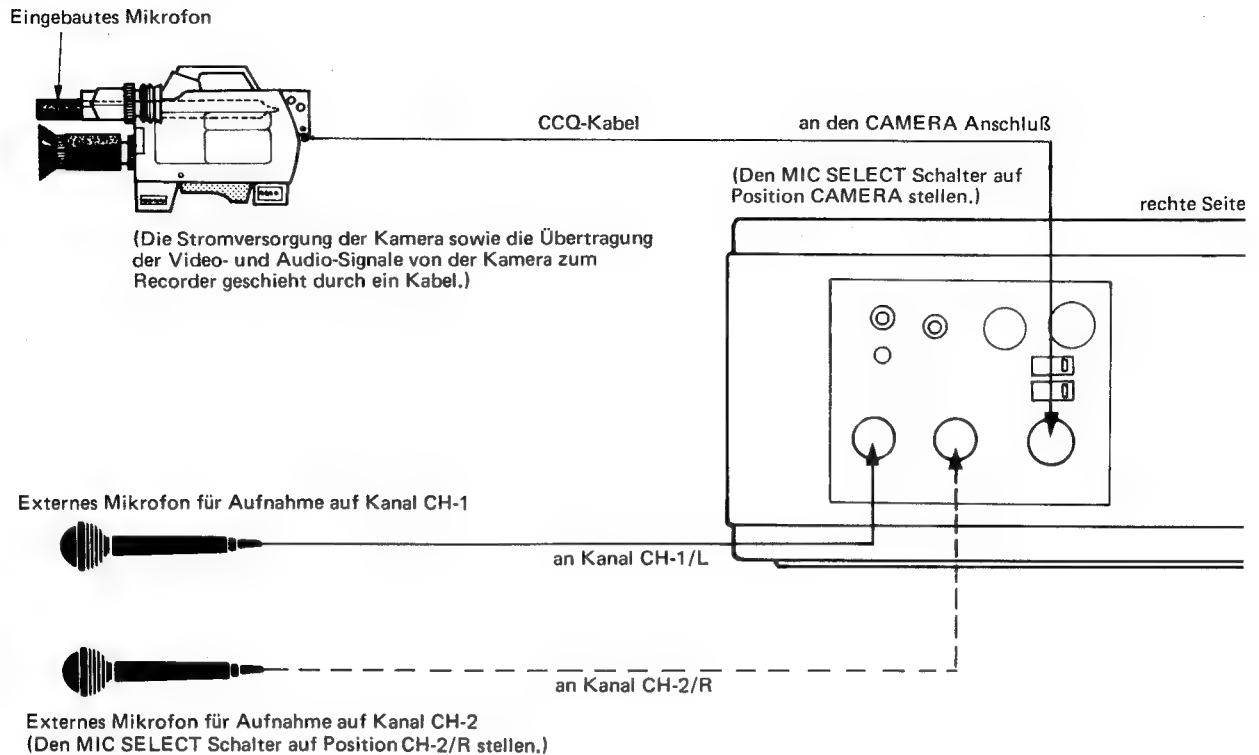


Das Batteriepack und das Netzgerät können nicht gleichzeitig angeschlossen werden.

HINWEIS ZUM ANSCHLUSS EINER BATTERIEBETRIEBENEN KAMERA, DIE NICHT VON SONY HERGESTELLT IST

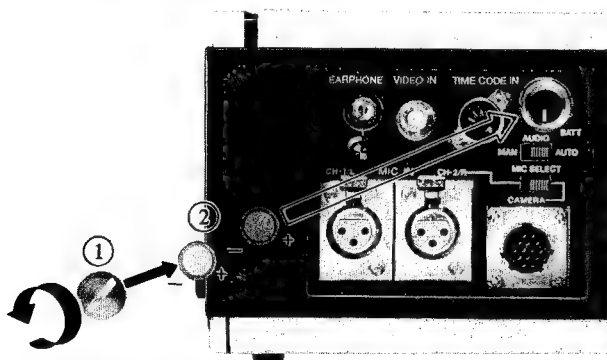
Falls eine nicht von Sony hergestellte batteriebetriebene Kamera an diesen Recorder angeschlossen wird, werden die Batterien dieses Recorders und der Kamera evtl. parallel geschaltet. Da diese beiden Batterien normalerweise einen Spannungsunterschied aufweisen, fließt ein Strom von der Batterie mit höherem Spannungspotential zu der mit dem niedrigeren, so daß die Lebensdauer der Batterie mit der niedrigeren Spannung verkürzt wird. In einem solchen Fall daher den zweiten Stiftanschluß des Kamerakabels abtrennen, um eine Verkürzung der Batterielebensdauer zu vermeiden (siehe Verdrahtungsdiagramm auf Seite 1-21).

1-4-2. Signalanschlüsse



1-4-3. Einsetzen der Speicher-Schutzbatterie

- ① Den Deckel mit Hilfe einer Münze gegen den Uhrzeigersinn drehen und abnehmen. Nach dem Einsetzen der Batterien den Deckel wieder anbringen.
- ② Silberoxid- oder Quecksilberbatterien (2 Eveready S-76 Batterien, oder gleichwertig) verwenden. Auf richtige Polung achten.



- Die Speicher-Schutzbatterien haben normalerweise eine Lebensdauer von einem Jahr. Wenn die Batterien für längere Zeit verwendet wurden und das Zählwerk nicht mehr richtig anzeigt, müssen die Batterien erneuert werden.
- Bei eingeschalteter Stromversorgung arbeitet das Echtzeit-Zählwerk normal, auch wenn keine Speicher-Schuttbatterien eingesetzt sind.

1-5. BEDIENUNG

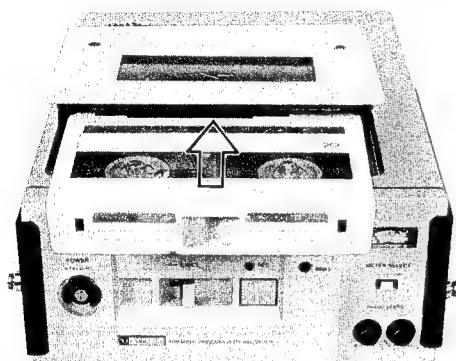
1-5-1. Bedienungsvorgänge

1) Stromversorgung einschalten.

Den Stromschalter betätigen, woraufhin das Digital-Echtzeit-Zählwerk aufleuchtet, und auch die Kamera mit Strom versorgt wird.

2) Cassette einsetzen.

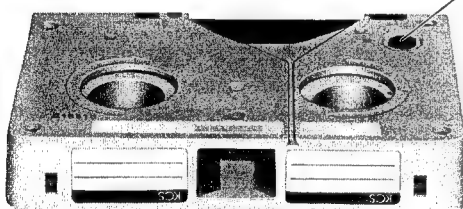
Durch Drücken der EJECT Taste in Pfeilrichtung (links) wird der Cassettenschacht angehoben. Nun die Cassette gemäß Abbildung einsetzen.



Nach dem Schließen des Cassettenschachtes wird das Magnetband eingefädelt und der Recorder auf Bereitschaft geschaltet.

- Vor dem Einsetzen der Cassette prüfen, daß der an der Cassetten-Rückseite angebrachte rote Sicherungsknopf nicht entfernt ist. Wenn dieser Knopf fehlt, kann der Recorder nicht auf Aufnahme geschaltet werden.

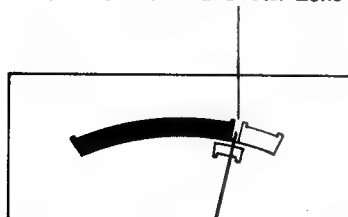
Sicherungsknopf (rot)



3) Aussteuern des Aufnahmepegels

Den AUDIO AUTO/MAN Wahlschalter auf AUTO stellen, wenn der Aufnahmepegel des Tonsignals automatisch ausgesteuert werden soll. Für manuelle Aussteuerung diesen Schalter auf MAN und den METER SELECT Schalter auf AUDIO stellen. Die AUDIO LEVEL Regler so einstellen, daß die Nadel des Pegelmessers sich zwischen der schwarzen und roten Zone bewegt.

0dB zwischen schwarzer und roter Zone (Bezugspegel)



4) Mit der Aufnahme beginnen.

Die REC-Taste des Recorders oder die START-Taste der Kamera drücken, um mit der Aufnahme zu beginnen. Die REC-Lampe beginnt zu blinken, um die Aufnahmefunktion anzuzeigen.

- Während der Aufnahme leuchtet auch das Rotlicht im Sucher der Kamera auf.

5) Die Aufnahme beendigen.

Die REC-Taste des Recorders oder die START-Taste der Kamera nochmals drücken, um die Aufnahme zu beenden. Die REC-Lampe erlischt, und der Recorder wird auf Bereitschaft geschaltet.

- Wenn die Aufnahme mit Hilfe der START-Taste der Kamera eingeleitet wurde, muß diese Taste zum Beenden der Aufnahme nochmals betätigt werden, da in diesem Fall das Bandlaufwerk nicht mit Hilfe der REC-Taste abgeschaltet werden kann.
- Aus der Bereitschaftsfunktion läßt sich der Recorder sofort wieder auf Aufnahme schalten, ohne daß es zu Bildfehlern zwischen den einzelnen Aufnahmen kommt. Falls jedoch die Zeitspanne zwischen zwei Aufnahmen weniger als eine Sekunde beträgt, kann ein glatter Bildübergang nicht gewährleistet werden.
- Für längere Pausenintervalle die Stromversorgung abschalten, um sowohl die Bildköpfe, das Magnetband als auch die Batterien zu schonen. Das Magnetband wird dann in die Cassette zurückgespult (Entladen) und die Stromversorgung abgeschaltet.
- Im Sucher der Kamera kann die Aufnahme direkt mitverfolgt werden.
- Schwarzweiß-Kameras, die keine Ausgleichsimpulse in den Synchronsignalen erzeugen, können mit diesem Recorder nicht verwendet werden.

Ammerkung zur Kondensierung von Feuchtigkeit

Wird der Recorder von einem kalten direkt an einem warmen Ort gebracht, dann kann es zu Kondensatbildung an der Bildkopftrommel kommen. Kondensat kann dazu führen, daß das Magnetband an der Bildkopftrommel anhaftet. Um daher eine mögliche Beschädigung des Magnetbandes zu vermeiden, keine Cassette einsetzen, wenn nach dem Einschalten des POWER Schalters (Position ON) die HUMID Lampe aufleuchtet.

Leuchtet die HUMID Lampe bei eingeschalteter TAPE END oder BATTERY Kontrollampe auf, die Cassette nicht auswerfen. In diesem Falle warten, bis die HUMID Lampe erlischt. Leuchtet die HUMID-Lampe dagegen während der Aufnahme, Bereitschaftsfunktion oder langen Pause auf, die Cassette auswerfen; anschließend warten, bis die Lampe wieder erlischt.

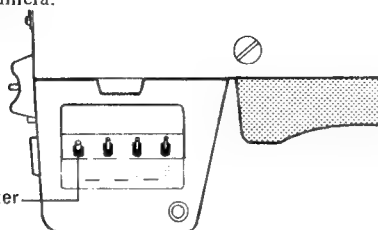
ANMERKUNG ZUR LANGEN PAUSE

Etwa acht Minuten nachdem der Recorder auf die Bereitschaftsfunktion bzw. auf Sparbetrieb geschaltet wurde, wird der Recorder auf die Funktion „lange Pause“ geschaltet. Dabei wird das Band an der Bildkopftrommel gelockert, um Beschädigung und Verschmutzung des Magnetbandes bzw. der Bildköpfe zu vermeiden. Bei dieser Betriebsart ist ein glatter Bildübergang nicht gewährleistet.

1-5-2. Sparbetrieb

Ist der Sparschalter eingeschaltet, dann wird die Leistungsaufnahme automatisch auf 6 W reduziert, wenn keine Videosignale dem Recorder eingespeist werden.

Bei der Kamera BVP-300P dient der CAMERA/VTR Schalter als Sparschalter. Für Einzelheiten beziehen Sie sich bitte auf die Bedienungsanleitung der Kamera.



CAMERA/VTR Wahlschalter

1-5-3. Warnsystem

Die Warnlampen, der Ohrhörer und das Kamera-Rotlicht informieren den Kameramann über die folgenden Zustände.

Warnlampen			Ohrhörer 1-kHz-Ton (Intervall)	Recorder- Betrieb	Kamera-Signallampen	
Lampe	(Zustand)	Betrieb (Intervall)			REC Lampe (oben)	BATT Lampe* (unten)
RF	(Video-Anfahmesystem gestört)	Blinkt (0,25 sek.)	Ja (0,25 sek.)	Kontin.	Blinkt (0,25 sek.)	
SERVO	(Servo gestört)	Blinkt (0,25 sek.)	Ja (0,25 sek.)	Kontin.	Blinkt (0,25 sek.)	
HUMID (Kondensat auf Bildkopftrommel)	Cassette eingesetzt	Leuchtet	Ja (0,25 sek.)	Kontin.	Blinkt (0,25 sek.)	
	Keine Cassette	Leuchtet	Nein	Stopp		
SLACK	(Bandschleife)	Blinkt (0,25 sek.)	Ja (kontin.)	Kontin.	Blinkt (0,25 sek.)	
TAPE END	(Vor Bandende) **	Blinkt (1 sek.)	Ja (1 sek.)	Kontin.	Blinkt (1 sek.)	
	(Bandende)	Leuchtet	Ja (kontin.)	Stopp	Blinkt (0,25 sek.)	
BATTERY (Batteriespannung)	(niedrige Spannung) **	Blinkt (1 sek.)	Ja (1 sek.)	Kontin.	Blinkt (1 sek.)	Blinkt (1 sek.)
	(erschöpft)	Leuchtet	Ja (kontin.)	Stopp	Blinkt (0,25 sek.)	Leuchtet

* Die BATT Warnlampe arbeitet, wenn das Batteriepack des Recorders oder der Kamera erschöpft ist.

** Langsames Blinken (1-sek.-Intervall) der Lampen zeigt an, daß das Bandende in einigen Minuten erreicht wird.

Leuchtet bzw. blinkt eine der Warnlampen oder kann der Warnton vernommen werden, wie folgt vorgehen.

- **RF Lampe**
Kabel auf richtigen Anschluß prüfen. Falls die Kabel nicht die Störungsquelle sind, die Bildköpfe reinigen (siehe Seite 27).
- **SERVO Lampe**
Darauf achten, daß der CAMERA Anschluß und der VIDEO IN Anschluß nicht gleichzeitig belegt sind.
- **HUMID Lampe**
Vor dem Einsetzen einer Cassette darauf achten, daß die HUMID Lampe bei eingeschaltetem POWER Schalter nicht aufleuchtet. Falls die Cassette bei eingeschalteter Lampe eingesetzt wird, könnte das Magnetband an der Bildkopftrommel festkleben. Das Gerät an einem trockenen Ort aufstellen und warten, bis diese Lampe nicht mehr leuchtet. Leuchtet diese Lampe während des Betriebes auf, dann kommt es zu unregelmäßigem Bandlauf.

Bei Sparbetrieb vermindert sich die Drehzahl der Bildkopftrommel, wobei der Video-Signalverstärker abgeschaltet ist, um die Leistungsaufnahme zu verringern. Die Kamera-Ausgangssignale können jedoch im Sucher der Kamera überwacht werden.

- Der Tonsignalverstärker arbeitet dabei normal. Der Tonsignalaufnahmepegel kann beliebig eingestellt und über Ohrhörer mitgehört werden.

Wird die REC Taste während des Sparbetriebs gedrückt, dann benötigt der Servo-Schaltkreis etwa sechs Sekunden, bis er synchronisiert ist. Während dieser Zeitspanne blinken die SERVO Lampe und das Rotlicht im Sucher der Kamera. Sobald der Recorder auf Aufnahme geschaltet ist, leuchtet das Rotlicht stetig.

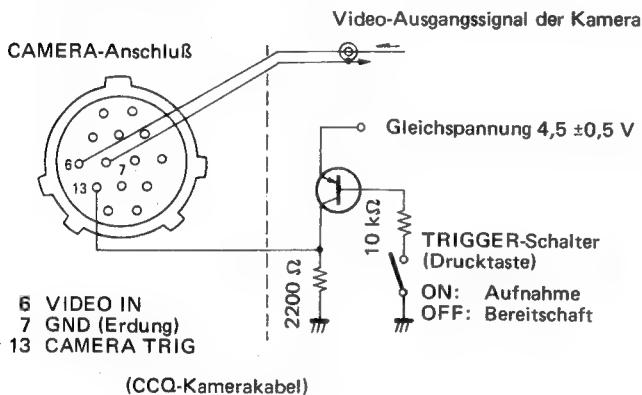
- **SLACK Lampe**
Den POWER Schalter drücken, um den Recorder abzuschalten. Die Cassette gemäß Abschnitt 2 (Wartungsanleitung) von Hand herausnehmen.

Hinweis: Falls das Band nicht vollständig in die Cassette zurückgespult wird, nicht die EJECT Taste betätigen, da das Band beschädigt werden könnte.

1-5-4. Ein- und Abschalten mit einer Kamera ohne CCQ-Kabel

Ist die verwendete Kamera nicht mittels CCQ-Kabel mit dem Recorder verbunden, dann kann die Aufnahme durch eine der beiden folgenden Verbindungen gestartet und gestoppt werden.

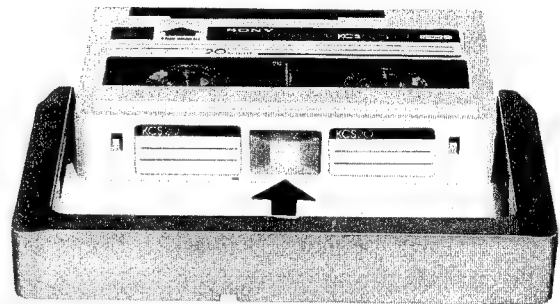
- Anschluß an die VIDEO IN Buchse (BNC)
Die Aufnahme beginnt, wenn ein Video-Eingangssignal eingespeist wird; wenn das Video-Eingangssignal ausbleibt, wird die Aufnahme gestoppt.
- Die Verbindung zum 14-poligen Kamera-Anschluß mit folgendem Schaltkreis herstellen:



1-6. VIDEOCASSETTEN-MAGNETBAND

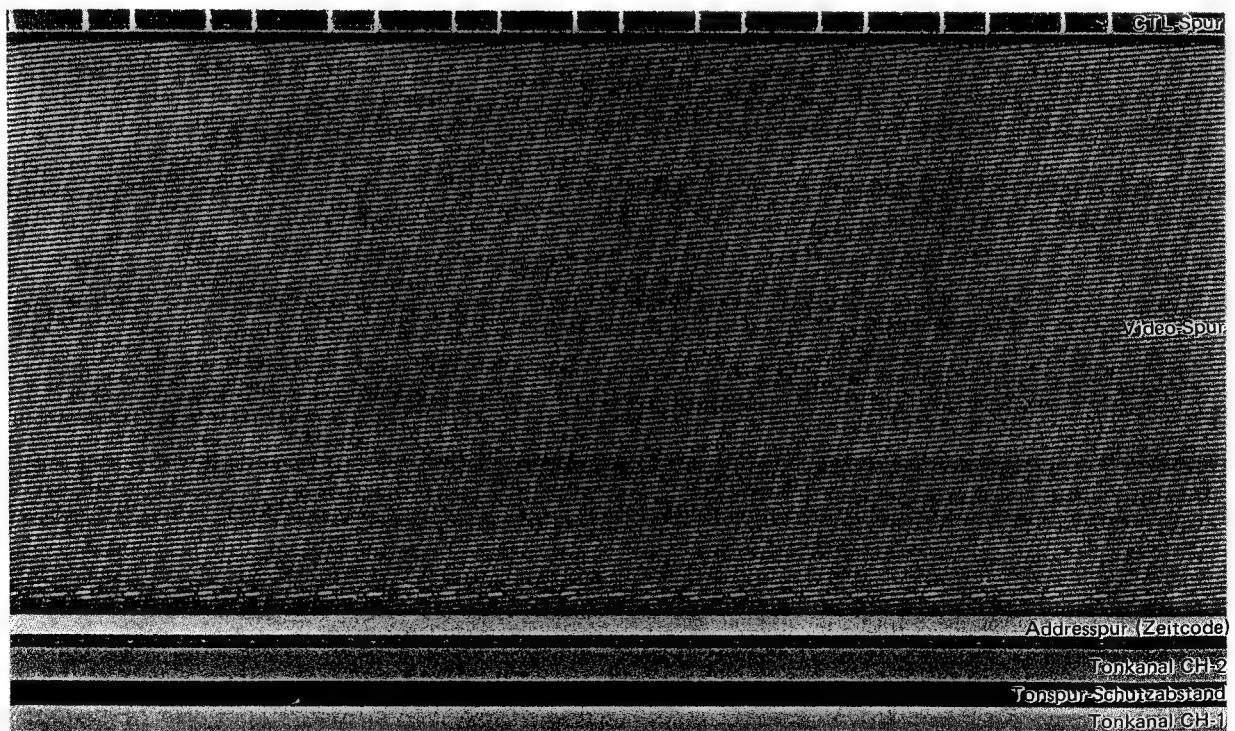
SONY Compact-Videocassetten U-matic (oder gleichwertige Cassetten) verwenden (z.B. KCS-20BR (20 min.) oder KCS-10BR (10 min.)). Der kleine rote Knopf an der Unterseite der Cassette darf nicht entfernt werden, falls Aufnahmen mit dieser Cassette durchgeführt werden sollen. Diesen Knopf nur entfernen, wenn die Cassette vor unbeabsichtigtem Löschen (Aufnahmesperre) geschützt werden soll.

Diese Videocassetten sind kleiner als normale U-matic Cassetten, wobei jedoch Spurmuster und Spulenabstand gleich sind. Die Cassetten sind daher austauschbar. Wenn diese Cassetten in das elektronische Schneidgerät (BVU-200P) für normale U-matic Cassetten eingesetzt werden, die Führungsnuten an der Cassetten-Rückseite mit den Nasen des Schneidgerätes ausrichten und die Cassette vorsichtig einführen. Für problemloses Einsetzen den Cassetten-Adapter KA-1 (Sonderzubehör) verwenden.



U-matic Videocassette + Cassetten-Adapter KA-1

In der nachfolgenden Abbildung ist das Spurmuster dieses Recorders dargestellt. Der EBU-Zeitcode, der vom externen Zeitcode-Generator abgenommen wird, wird auf die EBU-Zeitcode-Addresspur in überlagerter Form aufgezeichnet. Daher kann es zu einem instabilen Bild kommen, wenn Cassetten mit EBU-Zeitcode-Aufnahmen in einen marktüblichen U-matic (H) Recorder eingesetzt werden. Die Modelle BVU-100P und BVU-200P wurden speziell für die Wiedergabe dieser Zeitcode-Aufnahmen konstruiert.



1-7. REINIGEN DER BILDKÖPFE

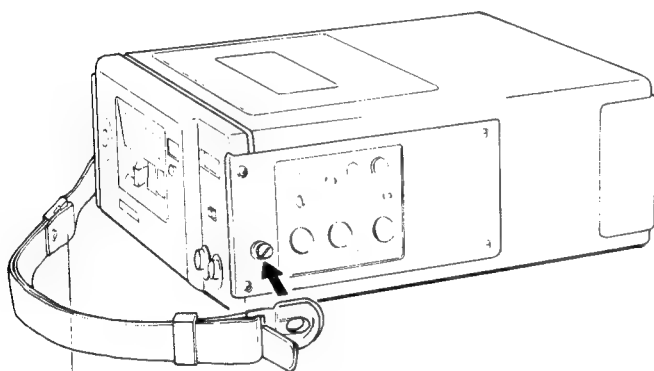
Für das Reinigen der Bild- und Tonköpfe die Reinigungscassette KCS-1C verwenden.

Die Reinigungscassette gleich wie eine normale Videocassette in den Cassettenschacht einsetzen. Danach das Gerät auf Aufnahme schalten, wodurch die Köpfe gereinigt werden. Das Reinigungsband kann zurückgespult und vier- oder fünfmal wiederverwendet werden.

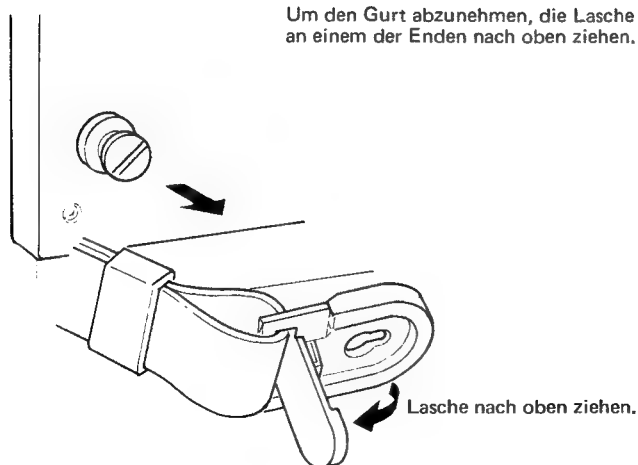
Hinweis: Die STOP Taste drücken, bevor das Digital-Echtzeit-Zählwerk 30 SEC anzeigt. Zu häufiger Gebrauch der Reinigungscassette verkürzt die Lebensdauer der Köpfe.

1-8. SCHULTERGURT

Der mitgelieferte Schultergurt kann gemäß nachfolgender Abbildung am Videocassetten-Recorder angebracht werden.

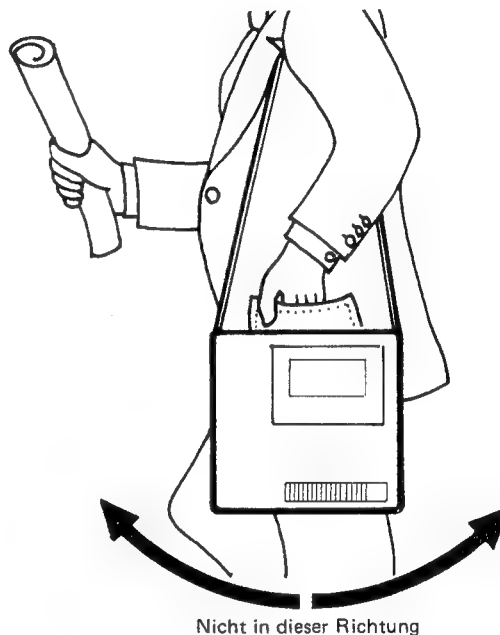


Länge einstellen



1-9. VORSICHTSMASSNAHMEN BEIM BETRIEB

- Das Gerät nicht bei extrem hohen bzw. tiefen Temperaturen oder bei übermäßiger Feuchtigkeit verwenden. Die zulässige Betriebstemperatur liegt zwischen 0°C und 40°C. Plötzlichen Temperaturwechsel vermeiden; das Gerät nicht von einem sehr kalten an einen warmen Ort bringen, da dies zu Kondensatbildung an der Bildkopftrommel führt (siehe auch HUMID Lampe auf Seite 1-25).
- Das Gerät nicht unnötig Vibrationen aussetzen. Wird das Gerät in vertikaler Position getragen, dann sollte es nicht in Pfeilrichtung der Abbildung „geschwungen“ werden.



- Staubige Orte vermeiden.
- Nach Gebrauch des Recorders die Batterien zum Entladen im Gerät belassen (Minimalspannung 10,8 V) und dann aufbewahren. Wenn die Batterien allerdings vollständig entladen werden, weil der POWER-Schalter irrtümlicherweise auf ON belassen worden ist, wird die Batterielebensdauer dadurch beeinträchtigt.

Zusätzliche Funktionen

Funktionsspeicher

Nach dem Einsetzen der Cassette wird das Magnetband eingefädelt, so daß das Band in Kontakt mit der Bildkopftrommel kommt. Für dieses Einfädeln werden etwa fünf Sekunden benötigt.

Der Funktionsspeicher ermöglicht nun das Drücken der REC-Taste schon vor Beendigung des Einfädelns; sobald danach das Band richtig eingezogen ist, beginnt die Aufnahme.

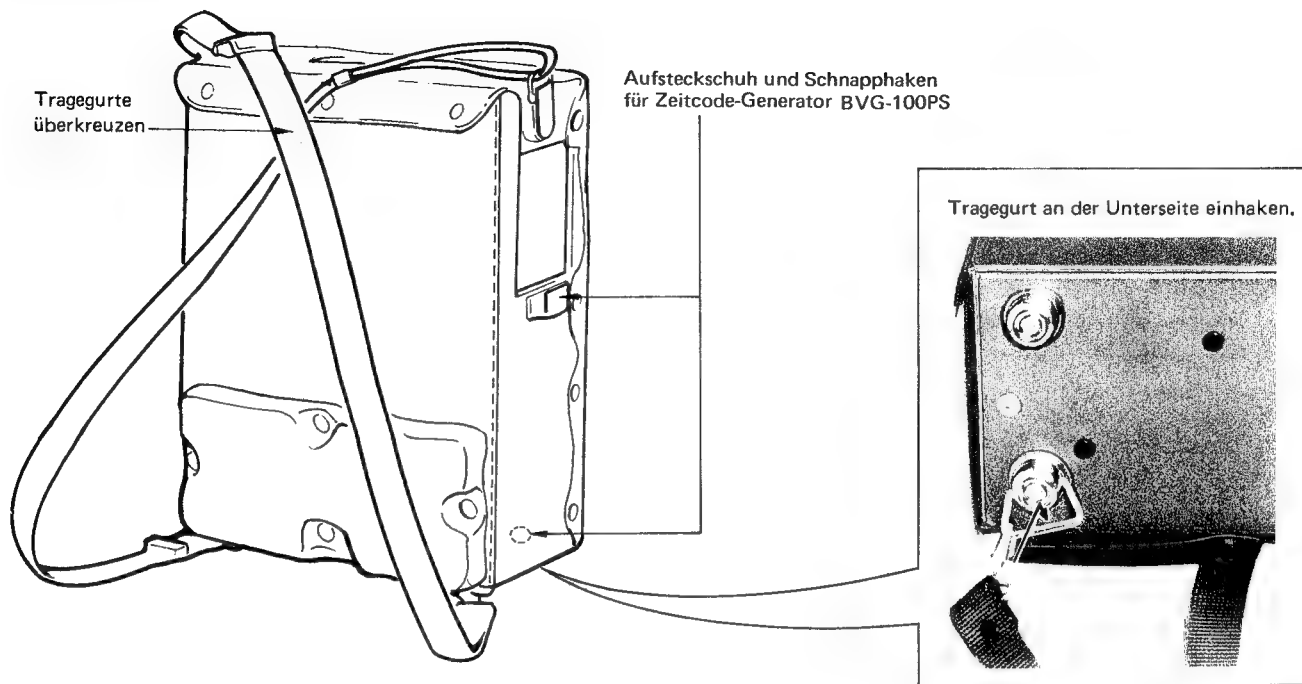
Abschaltautomatik

Am Bandende wird das Bandlaufwerk des Recorders automatisch abgeschaltet; die Abschaltautomatik arbeitet auch während der Aufnahme, wenn die Batteriespannung unter die Nennspannung abfällt.

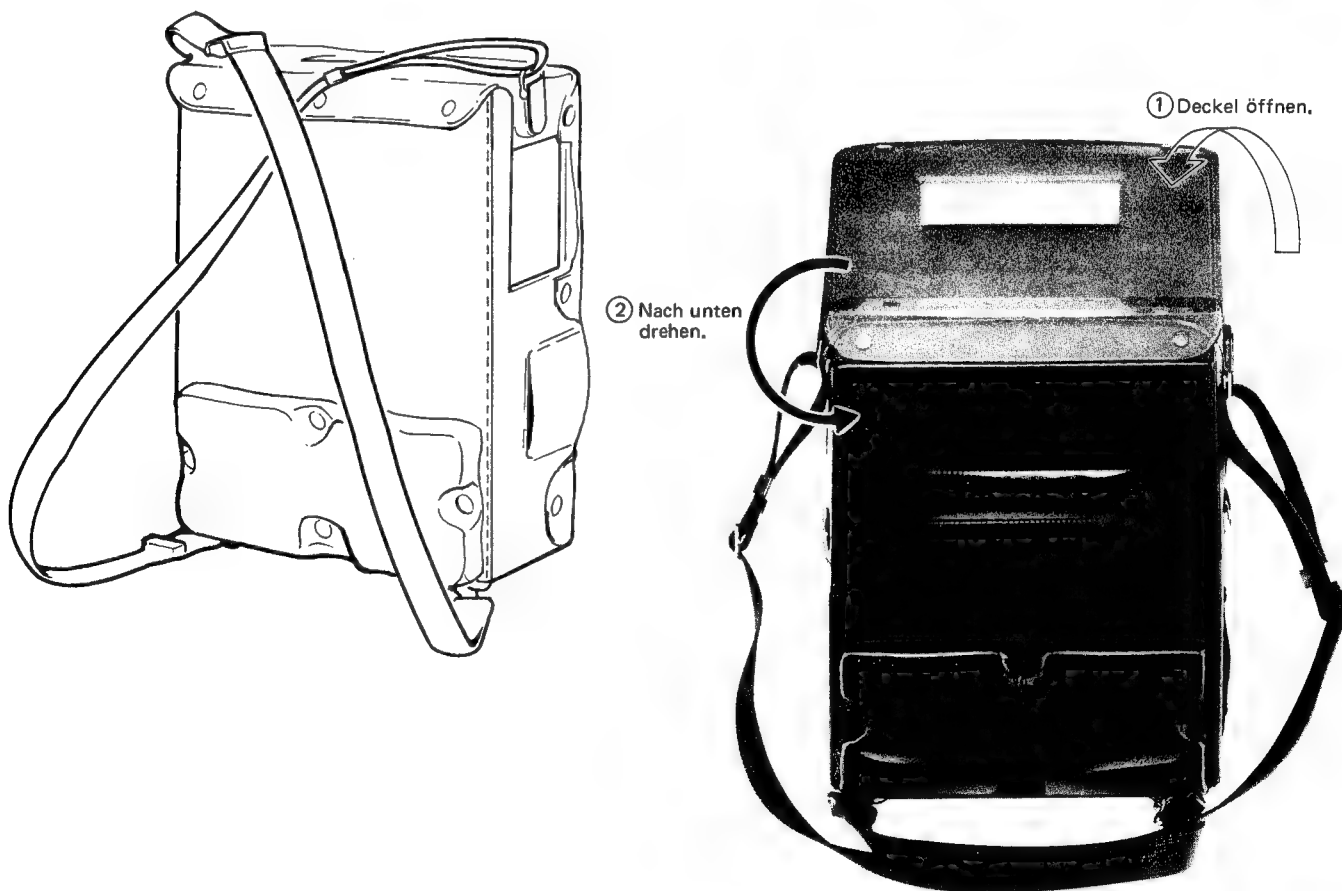
1-10. TRAGETASCHE

Mit der mitgelieferten Tragetasche und den Tragegurten kann der Recorder auf dem Rücken getragen werden.

Seriennummer 10625 oder weniger



Seriennummer 10626 oder mehr



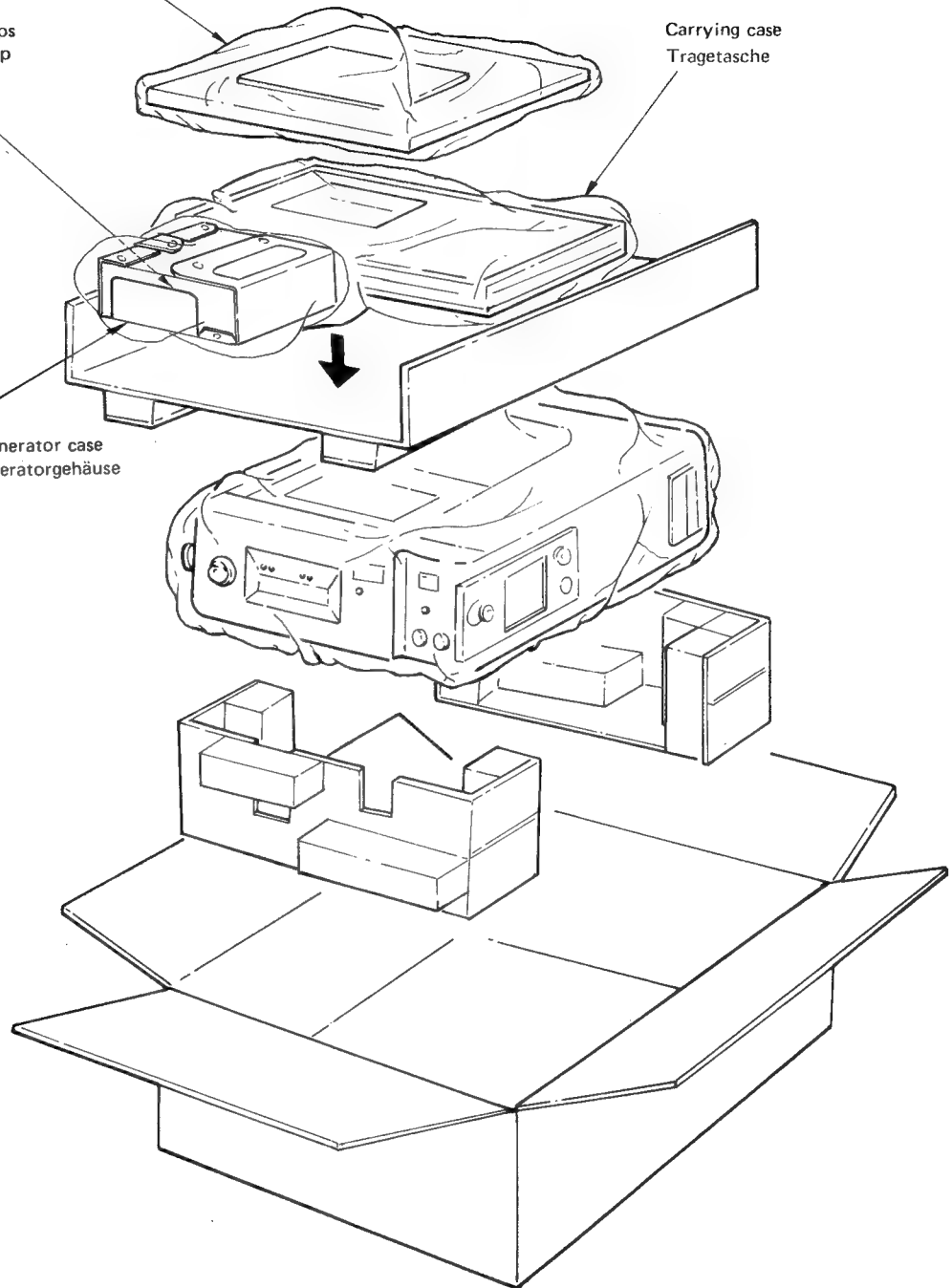
1-11. PACKAGING/VERPACKUNG

Operation and maintenance manual
Bedienungs- und Wartungsanleitung

Carrying straps
Shoulder strap
Tragegurte
Schultergurt

Carrying case
Tragetasche

Time code generator case
Zeitcode-Generatorgehäuse



SECTION 2

CAUTION AND OTHER INFORMATION

2-1. DISASSEMBLY AND ASSEMBLY OF CABINET

2-1-1. Removal of Cabinet

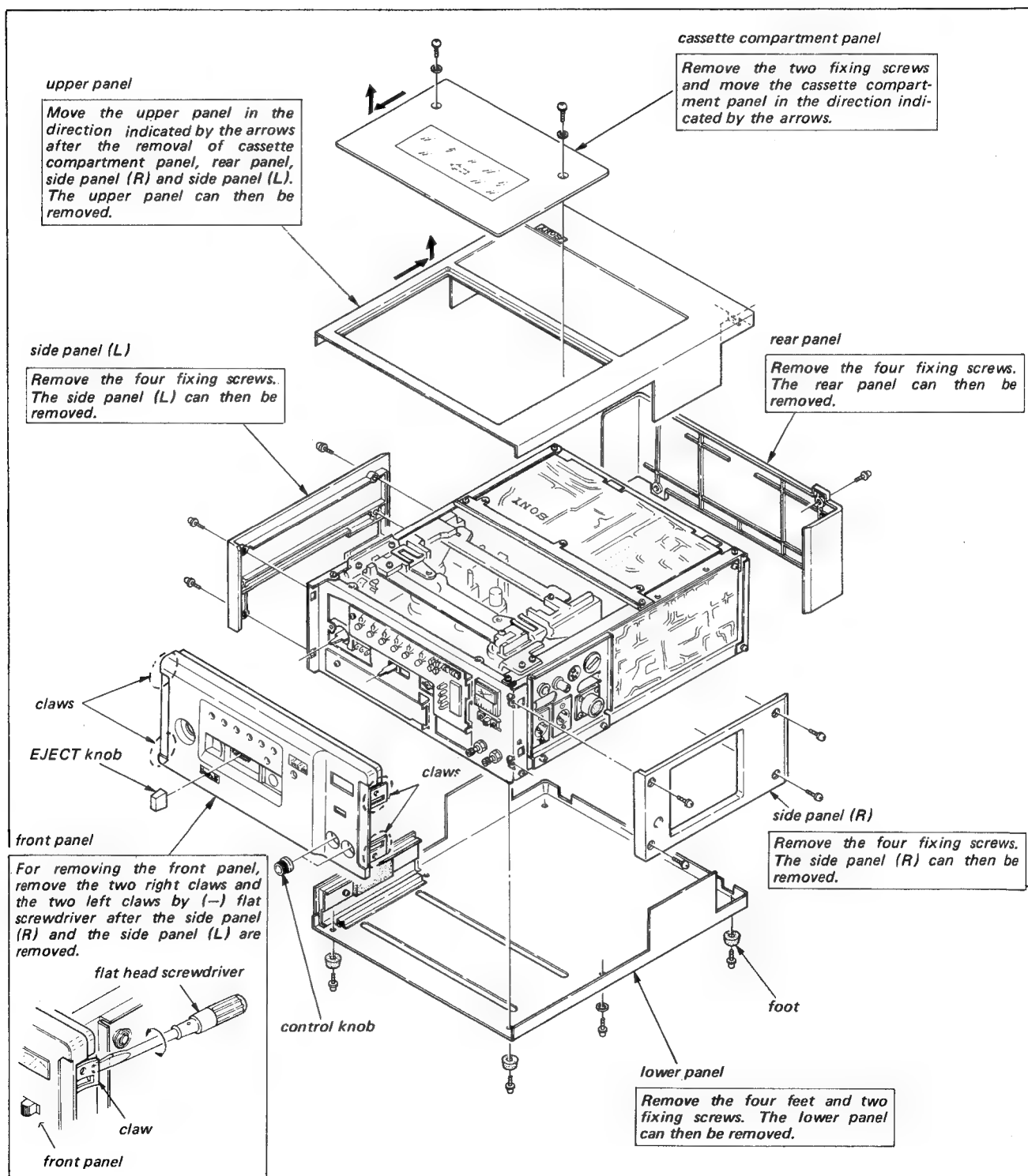


Fig. 2-1. Disassembly and assembly of cabinet

2-1-2. Cabinet Assembly

Reverse the disassembly procedure described in Section 2-1-1 for assembling the cabinet.

(Move the cabinet in the opposite direction against the arrow for assembly)

2-1-3. Removal of Cassette Compartment

- (i) Push the EJECT button toward left, and lift up the cassette compartment.
- (ii) Remove the four screws holding the cassette compartment.
- (iii) Remove the claw at the bottom of the right side plate shown in the detailed figure from the mechanical chassis.

Then the cassette compartment can be removed.

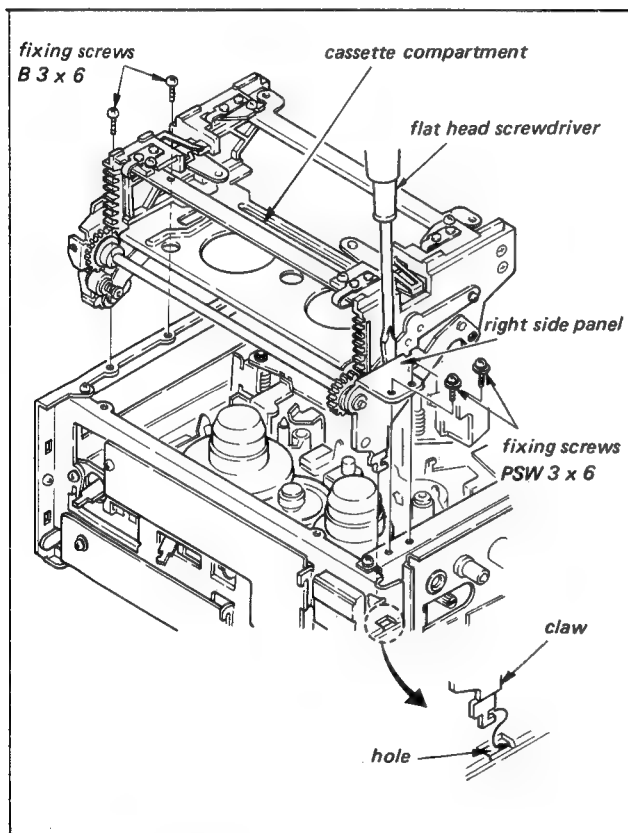


Fig. 2-2. Removal and attachment of cassette compartment

2-1-4. Attachment of Cassette Compartment

- (i) Place the cassette compartment on the machine.
- (ii) Put the claw at the bottom of the side plate into the hole of the mechanical chassis.
- (iii) Fix the left side of the cassette compartment with the two B 3 x 6 screws. (The head of the screw must be the bind type one. If other type screw is used, the cabinet cannot be attached.)
- (iv) Fasten the right side with two PSW 3 x 6 screws temporarily.
- (v) Tighten the two screws while adjusting the clearance with a flat head screwdriver so that the cassette compartment does not touch the right side plate as shown in Fig. 2-2.

2-2. NOTES ON SERVICING

2-2-1. Manual Rotation of Upper Drum

Be sure to turn the upper drum clockwise when it is required to turn the drum by the hand for the video head cleaning, the upper drum replacement, and the adjustment after the replacement. If not, the belt under the chassis will get out of place.

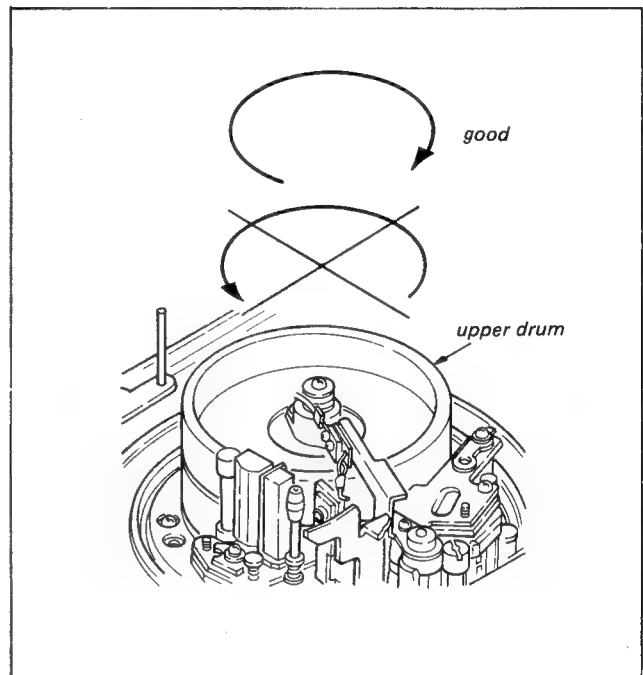



Fig. 2-3. Manual rotation of upper drum

2-2-2. Harness handling

This machine was designed as a portable VTR and no extra space for the components, especially the harness to the printed circuit boards is not provided. Therefore the utmost attention must be paid for the harness arrangements at the sections mentioned below.

- (i) Pinch solenoid section in upper portion of machine.
The parts and the wires of the SS-10 board that are attached vertically to the SS-9 board must not touch other parts after the SS-9 board is positioned in place.
- (ii) Drum motor section in upper portion of machine.
The wires and the capacitors of the drum motor section must not touch the threading ring, especially the pinch roller.
- (iii) CN-15 board section in the front portion of the machine.
The wires from the CN-15 board connector must be arranged so that they do not rise abnormally. If the wire arrangement in this section is poor, the front panel cannot be attached.
- (iv) Head drum section in the bottom portion of the machine.
The wires from the head drum and the wires from the SM-19/-20 board must not touch the belt and the pulley.

2-2-3. Spare Parts

1. **Safety Related Components Warning.**
Components identified by shading marked with  on the schematic diagrams, exploded views and electrical spare parts list are critical to safe operation. Replace these components with Sony parts whose part numbers appear in this manual or in service bulletins and service manual supplements published by Sony.
2. **Replacement Parts** supplied from Sony Parts Center will sometimes have a different shape from the original parts. This is due to "accommodating the improved parts and/or engineering changes" or "standardization of genuine parts."

This manual's exploded views and electrical spare parts list indicate the parts numbers of "the standardized genuine parts at present".

Regarding engineering parts changes in our engineering department, refer to Sony service bulletins and service manual supplements.
3. **Printed Components in Bold-Face type** on the exploded views and electrical spare parts list are normally stocked for replacement purposes. The remaining parts are not normally required for routine service work. Orders for parts not shown in Bold-Face type will be processed, but allow for additional delivery time.

2-3. MACHINE OPERATION WITHOUT CASSETTE INSERTED

- (i) Connect a video signal. (If the video signal is not inputted, the tape running state cannot be set up.)
- (ii) To disable the tape end sensor operation;
Apply a piece of an insulation vinyl tape on the LED so that the solar battery cannot receive the infrared rays from the LED. But never attach the insulation tape on the solar battery itself because the battery will get out of place easily.

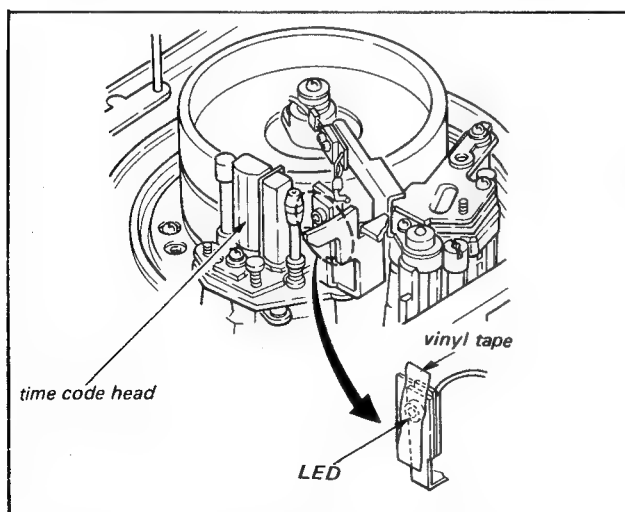


Fig. 2-4. To disable the tape end sensor operation

- (iii) To place the miss-record switch into ON state;
Insert a 2mm flat head screwdriver into the clearance between the actuator and the mounting plate through the hole on the left side plate side as shown in Fig. 2-5 and set the miss-record switch to the normally ON state.

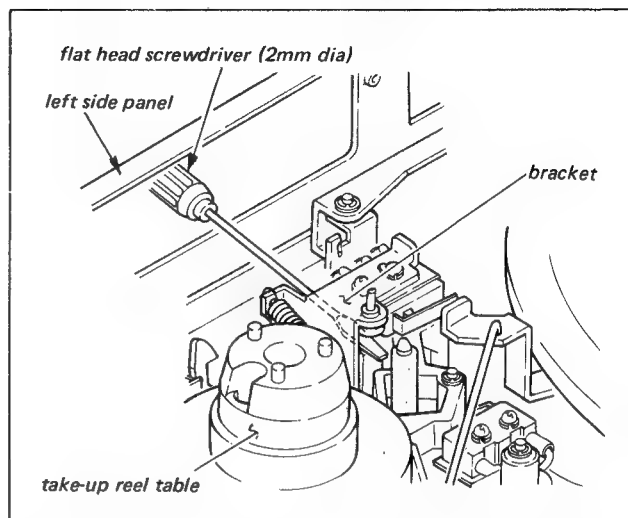


Fig. 2-5. To place the miss-record switch into ON state

- (iv) To set up the tape running state;
Set up the tape running state by depressing the REC button.

2-4. REMOVAL PROCEDURE OF CASSETTE AFTER OCCURANCE OF TAPE SLACK

The machine performs the unthreading operation as described on page 1-11 if the POWER switch is turned off after the HUMID or SLACK lamp turns ON. But when the machine cannot take up the tape onto the supply reel table, the tape remains in the machine. In such a case the tape can be removed from the machine with the following procedures.

- (i) Remove the cassette compartment panel, the rear panel, the right and left side panels, and the upper lid.
- (ii) Push the EJECT button in the left direction while pushing up the cassette lid with the hand for lifting the cassette.
- (iii) Close the cassette lid which has been pushed up by the hand slowly so that the tape outside of the cassette is not damaged.
- (iv) Remove the cassette from the cassette compartment while playing attention not to hung the tape on the tape guides.
- (v) Open the lid of the removed cassette and wind the tape into the cassette by turning the reel hub on the back of the cassette with the hand.
- (vi) Locate the trouble cause why the tape is not wound onto the supply reel at the POWER switch OFF and take the necessary measure for it.

2-5. ALIGNMENT TAPE

- (1) For BVU-50P
Parts No. : 8-960-020-61
Alignment tape RR5-1SB-PAL

Contents

Counter	Video	Audio	Time Code
000 ~ 137	Colour Bar (PAL)	3 kHz, 0dB	1 kHz
137 ~ 249	RF Sweep	—	—
249 ~ 346	Monoscope	—	—
346 ~ 390	Mod. 20T	1 kHz, 0dB	—
390 ~ 432	RF 8 MHz	10 kHz, -10dB	—

- (2) For BVU-50S
Parts No. : 8-960-020-81
Alignment tape RR5-1SB-SECAM

Contents

Counter	Video	Audio	Time Code
000 ~ 137	Colour Bar (SECAM)	3 kHz, 0dB	1 kHz
137 ~ 249	RF Sweep	—	—
249 ~ 346	Monoscope	—	—
346 ~ 390	Mod. 20T	1 kHz, 0dB	—
390 ~ 432	RF 8 MHz	10 kHz, -10dB	—

- (3) Note

- (i) The switching position of the monoscope signal can be viewed in the picture for an dihedral adjustment of the video heads.
(ii) The Mod. 20T signal on the RR5-1SB-SECAM is recorded in PAL signal but it can be used for the SECAM machines. Please utilize it.

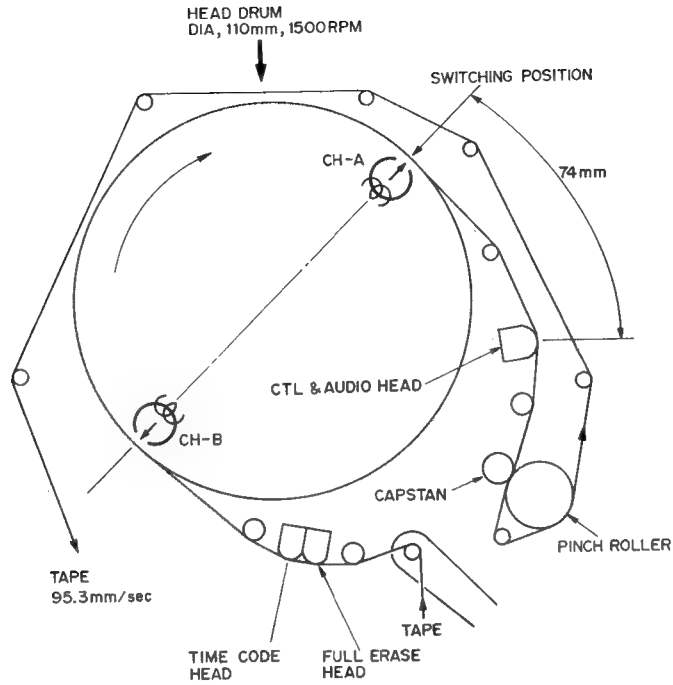
2-6. TOOL FOR SERVICE PURPOSE

Parts No.	Description	Purpose
J-600-182-0A	Drum eccentricity gauge (3)	Upper drum eccentricity adjustment
J-600-183-0A	Drum eccentricity gauge (2)	
J-600-184-0A	Drum eccentricity gauge (1)	
J-600-193-0A	Drum eccentricity gauge (4)	
J-600-228-0A	Torque measurment tape (80mm dia.)	Measurment of back tension and torque
J-600-229-0A	Dihedral adjusting screws	Video head dihedral adjustment
J-600-495-0A	BVU-50 PB check jig	Video /Audio/TC track position adjustment
J-600-983-0A	Flatness plate	Erase/TC head slantness adjustment
J-613-001-0A	Reel table height check base jig	Reel table height adjustment
J-613-002-0A	Reel table height check jig	
Y-2031-001-0	Cleaning fluid	Cleaning
2-034-697-00	Chamois	
7-732-050-20	Tension scale (50g full scale)	Measurment of back tension and torque
7-732-050-30	Tension scale (100g full scale)	
7-732-050-40	Tension scale (200g full scale)	
7-732-051-02	Tension scale (1000g full scale)	
8-960-020-62	Alignment tape: RR5-2SB PAL	PAL system } Tracking, video and overall SECAM system } alignment
8-960-020-82	Alignment tape: RR5-2SB SECAM	
9-911-053-00	Thickness gauge	Clearance check

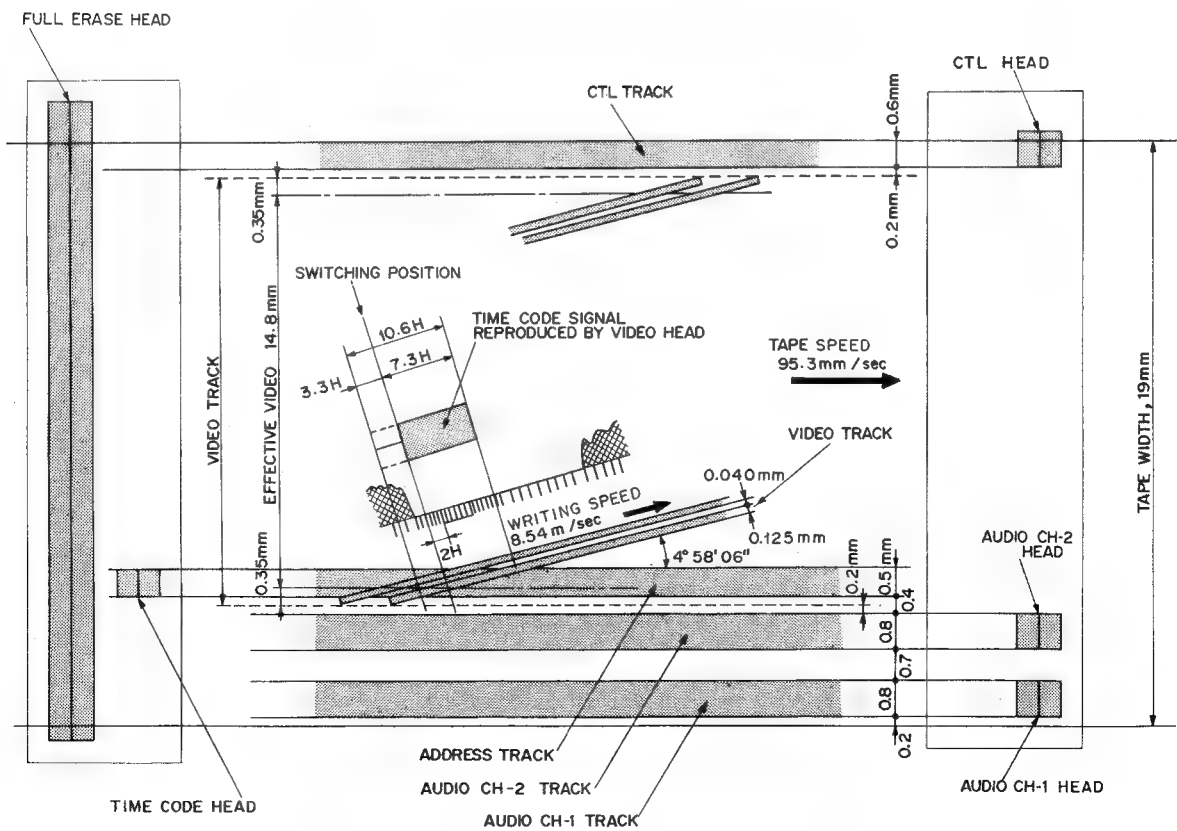
SECTION 3 DIAGRAM

3-1. TAPE FORMAT

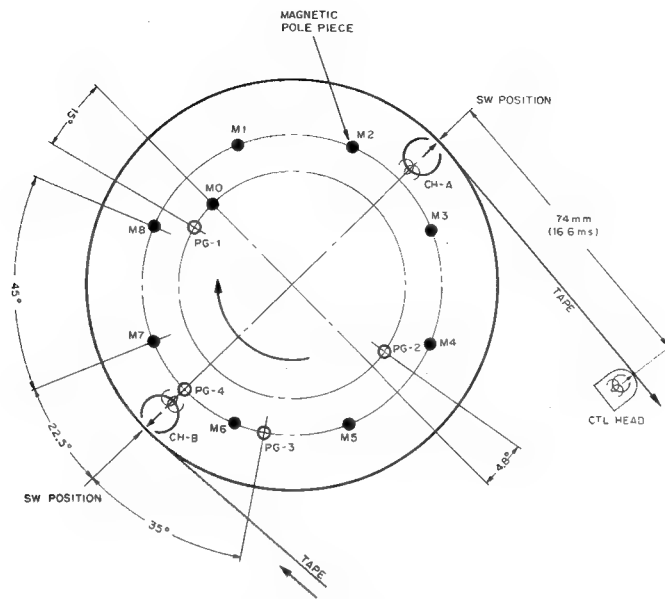
3-1-1. HEADS LOCATION



3-1-2. TAPE PATTERN

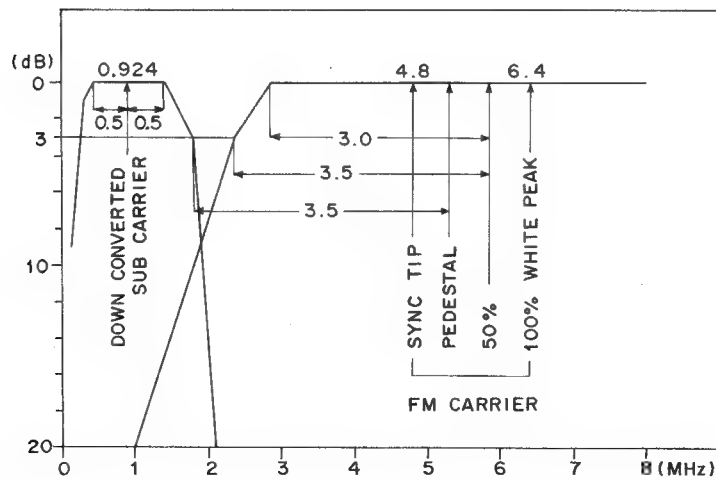


3-2. RELATIVE POSITION OF THE VIDEO HEADS & PG COILS

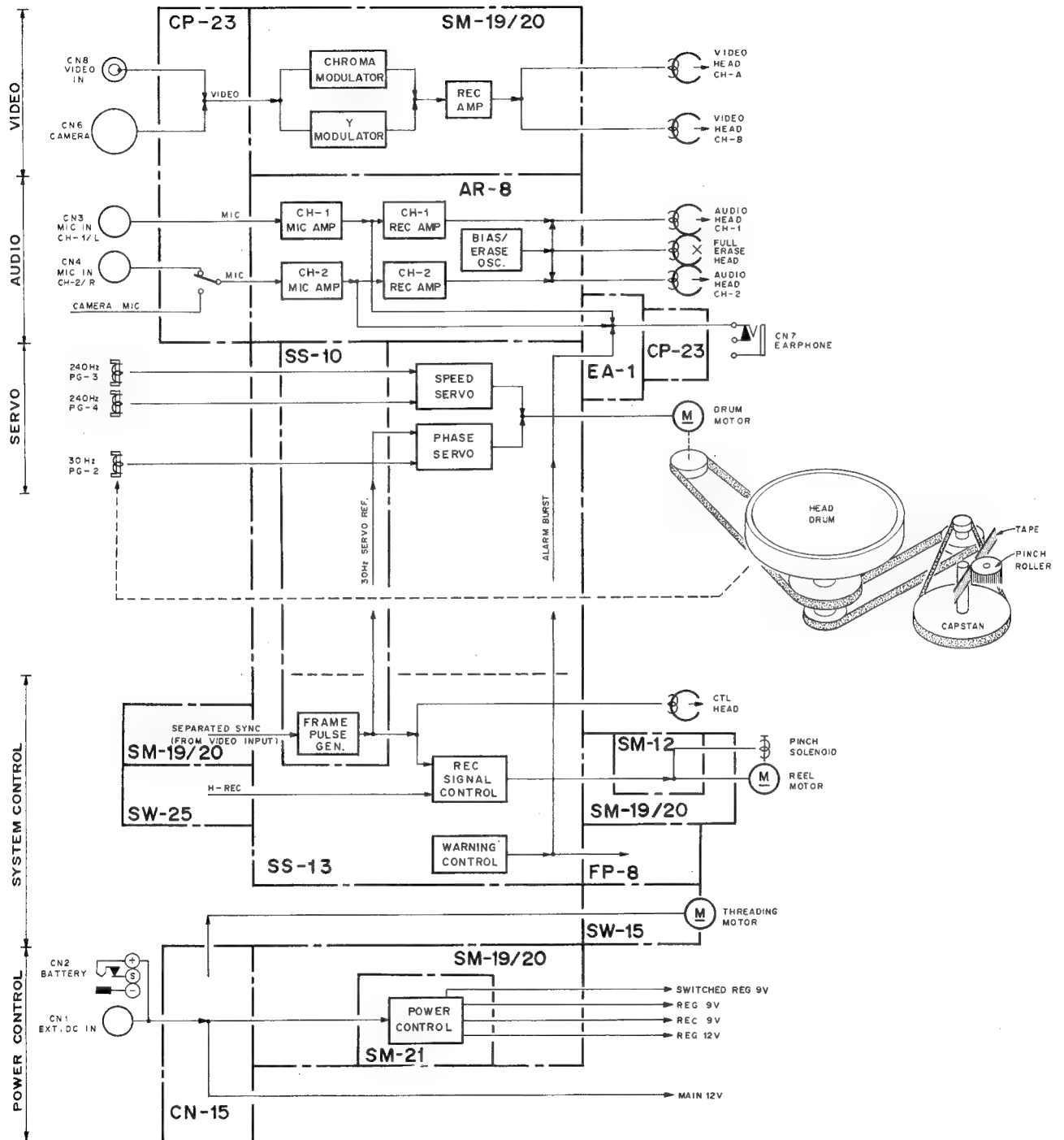


PG-1,-2,-3 AND PG-4 ARE ON THE LOWER DRUM (STATOR).
VIDEO HEADS AND MAGNETIC POLE PIECES (M0-M8) ARE ON THE UPPER DRUM (ROTOR).

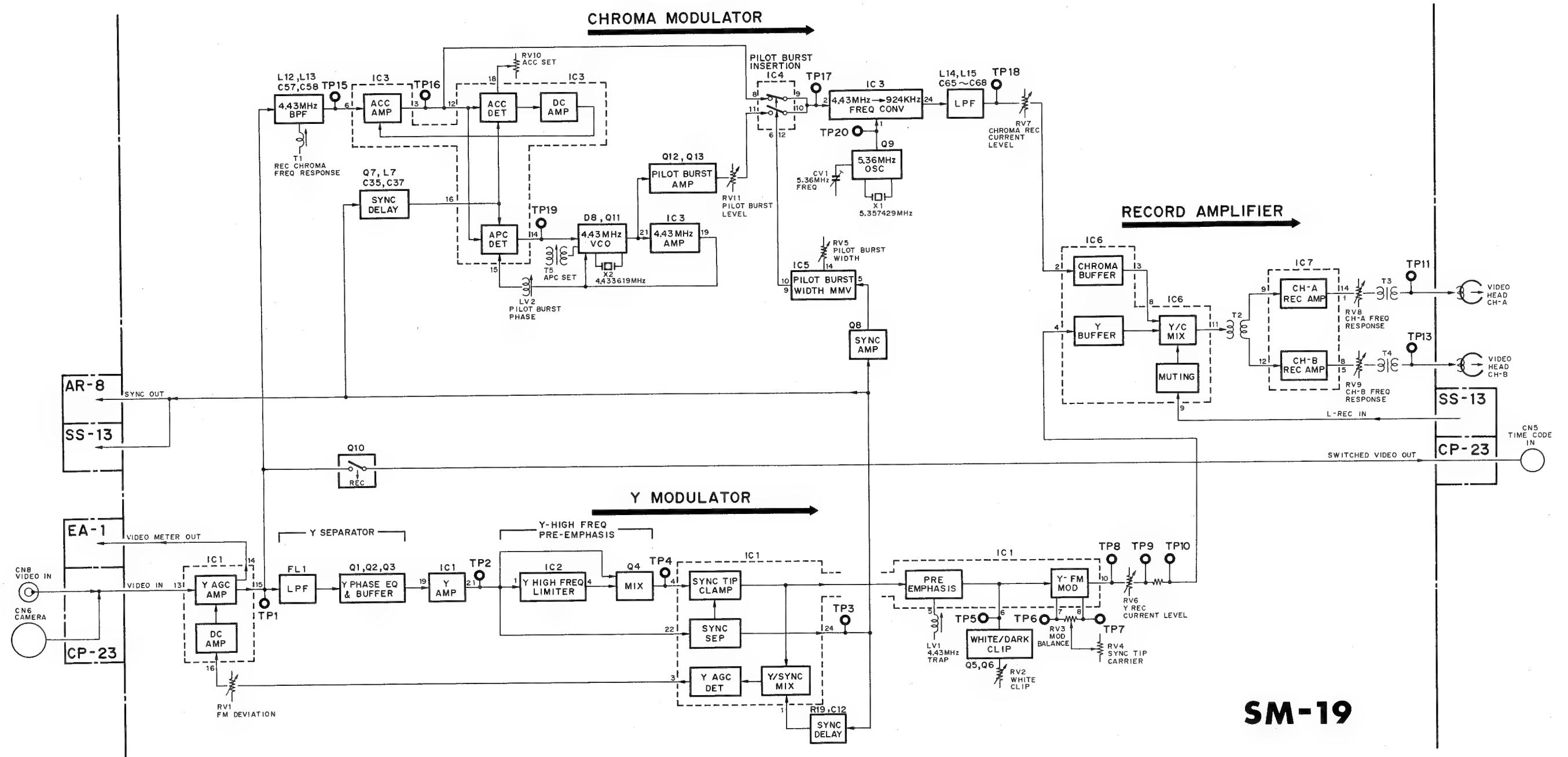
3-3. FREQUENCY ALLOCATION



OVERALL SYSTEM BLOCK DIAGRAM

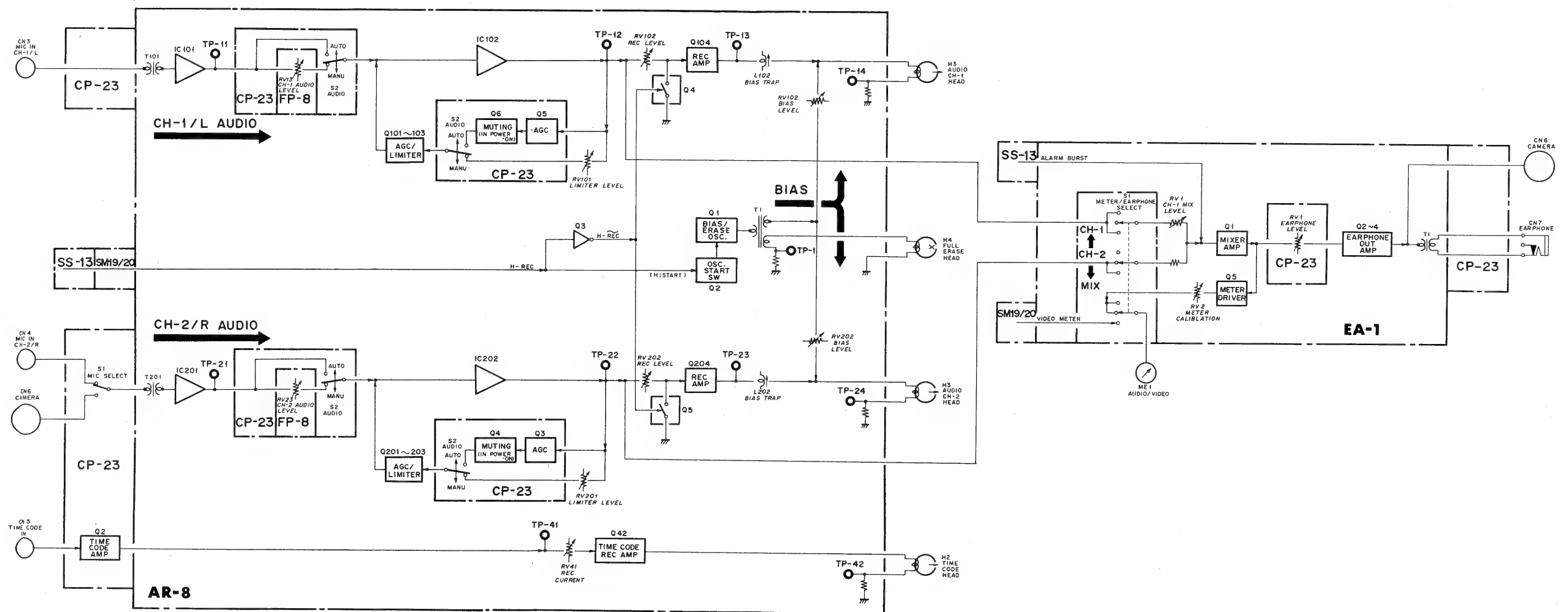


VIDEO SYSTEM BLOCK DIAGRAM

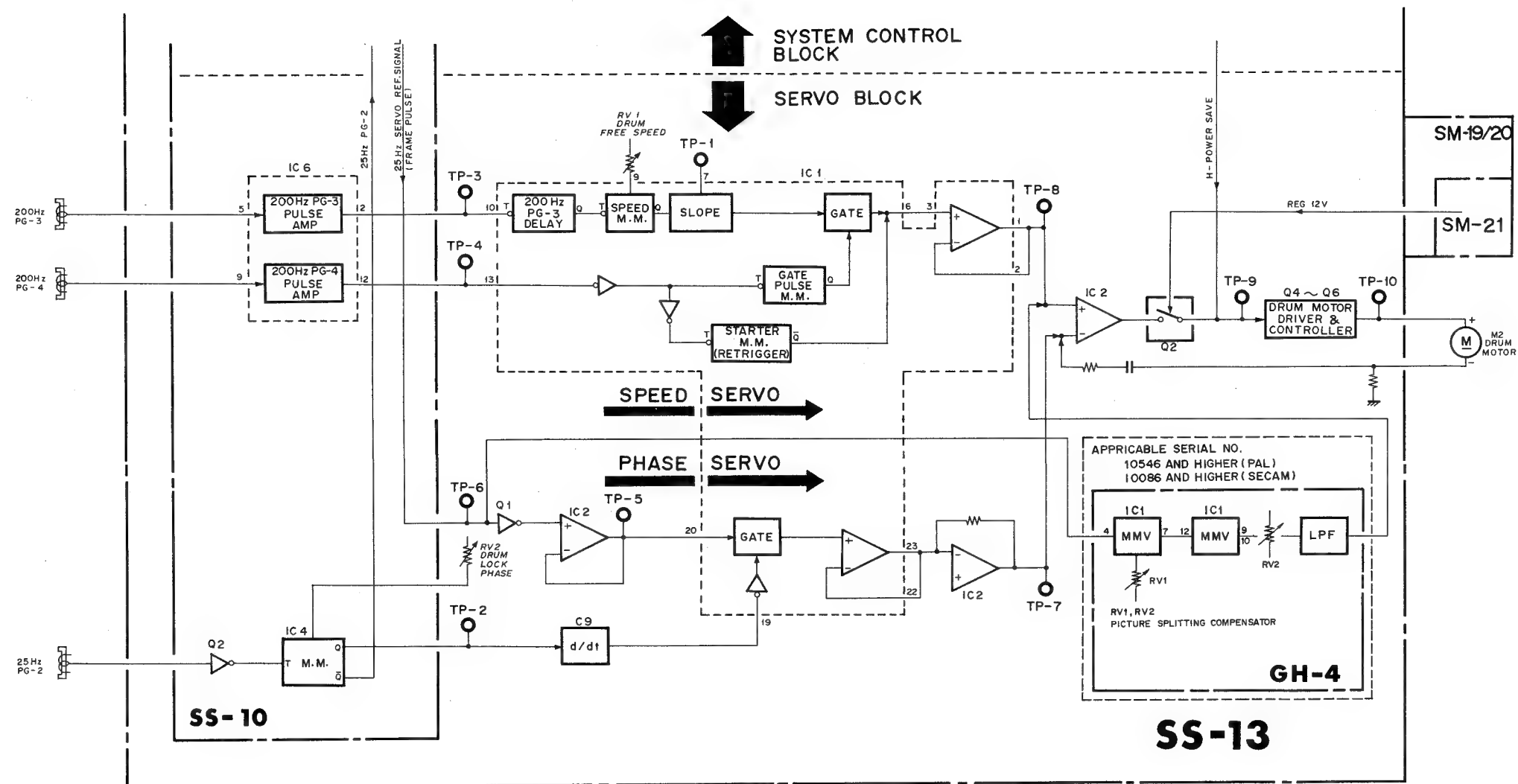


SM-19

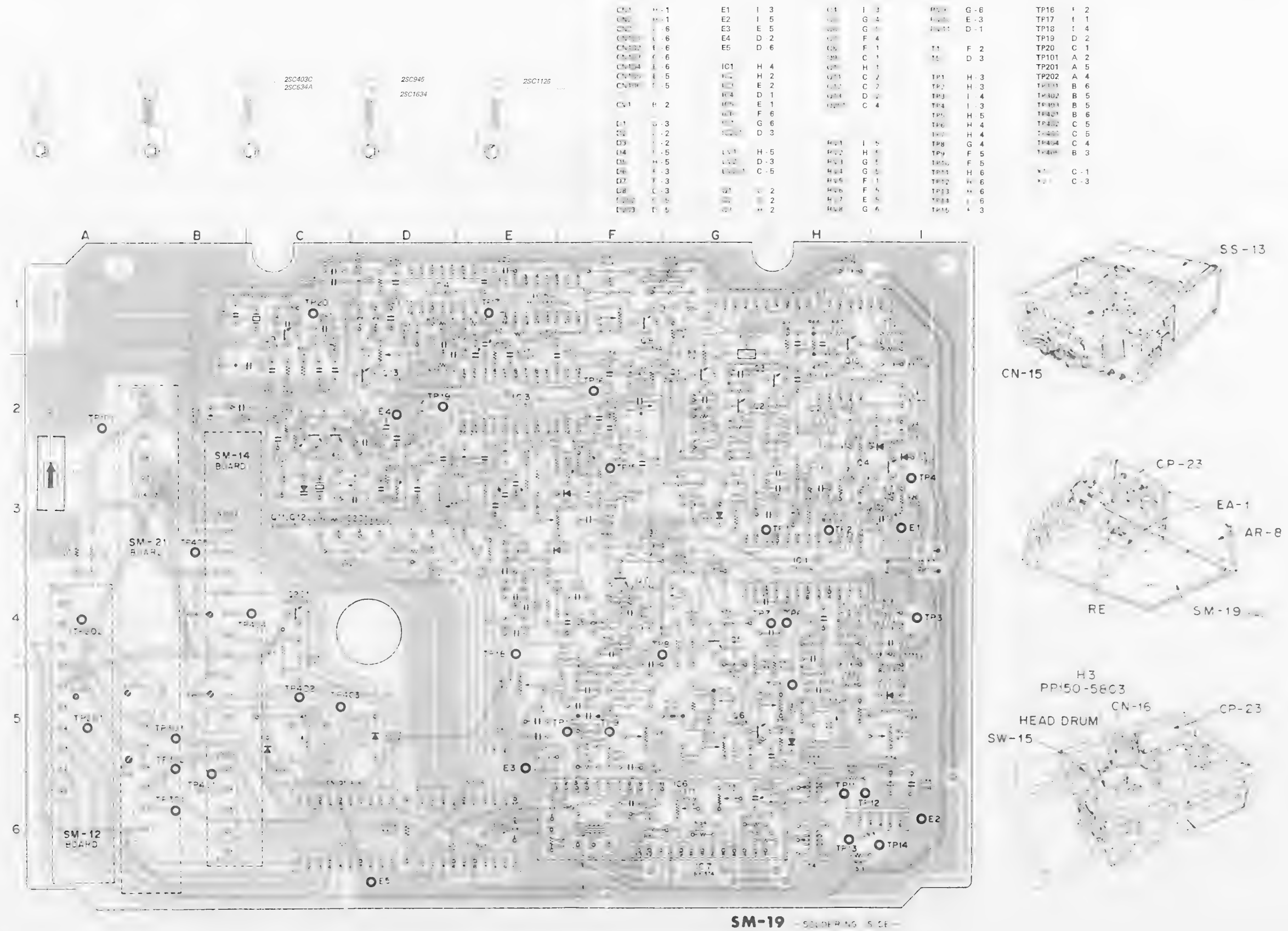
AUDIO SYSTEM BLOCK DIAGRAM



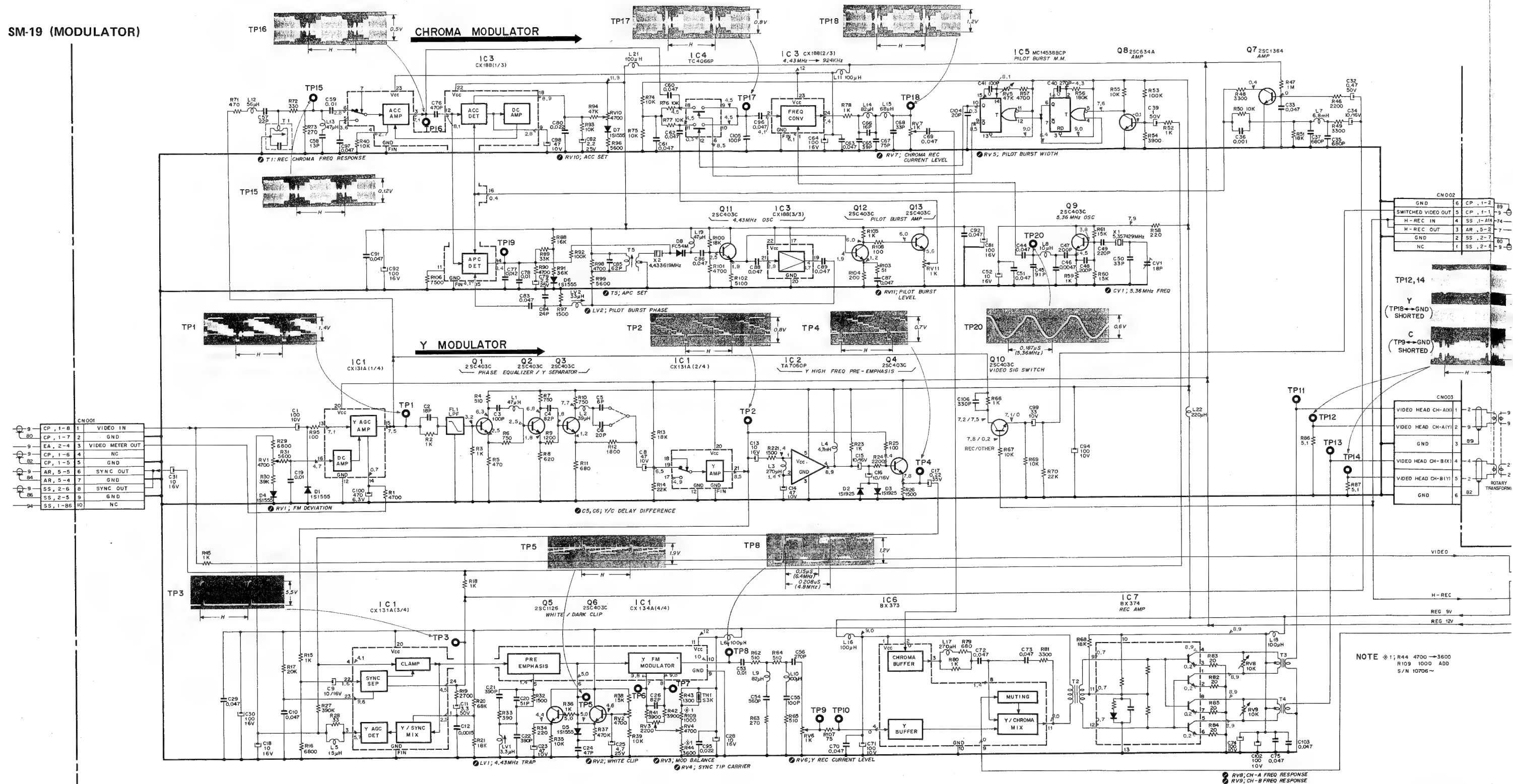
SERVO SYSTEM BLOCK DIAGRAM



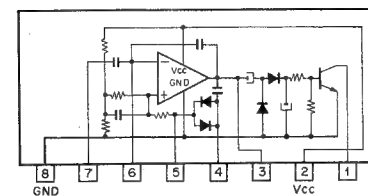
SM-19 (MODULATOR)



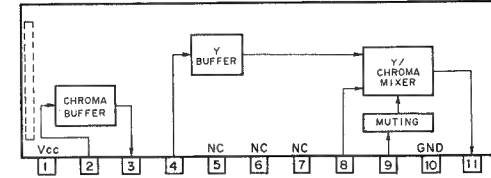
SM-19 (MODULATOR)



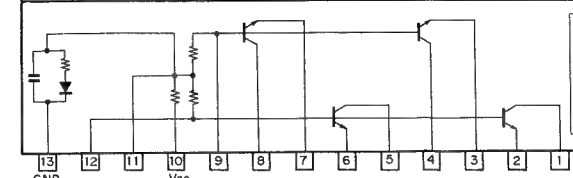
BX319 (SONY)
— IMPRINTED SIDE —



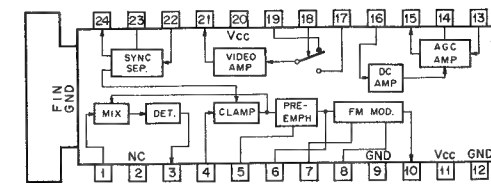
BX373 (SONY)
MIX AMP
- REAR VIEW -



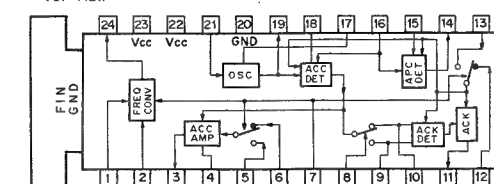
BX374 (SONY)
REC AMP
- IMPRINTED SIDE -



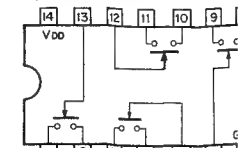
CX131A (SONY)
— TOP VIEW —

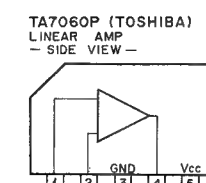
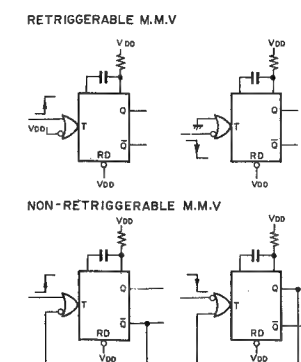
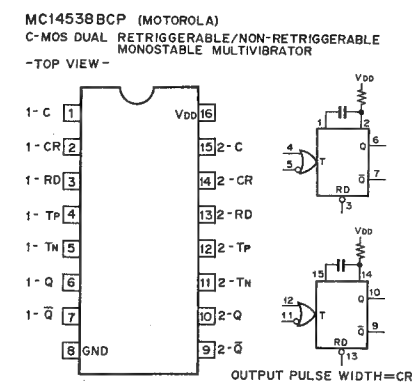
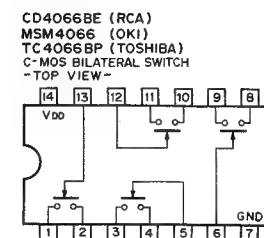
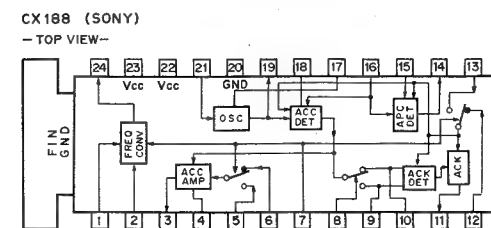
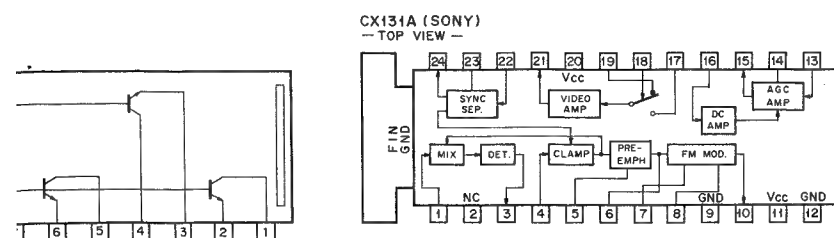


CX188 (SONY)
-TOP VIEW-

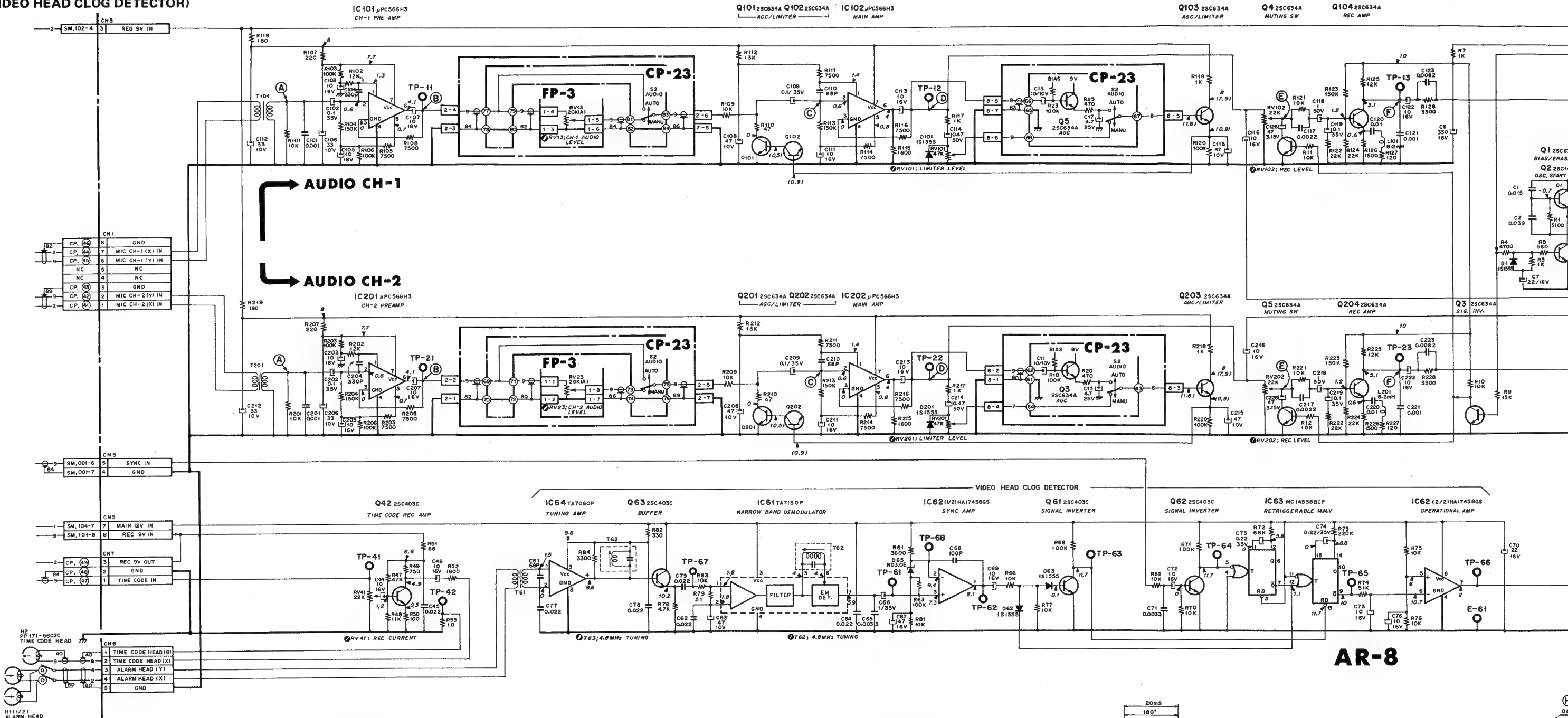


CD4066BE (RCA)
MSM4066 (OKI)
TC4066BP (TOSHIBA)
C-MOS BILATERAL SWITCH
-TOP VIEW-

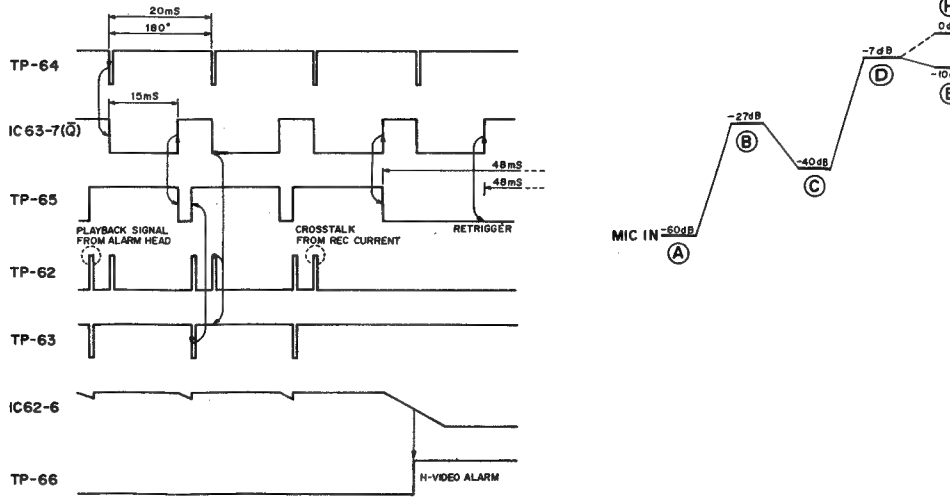
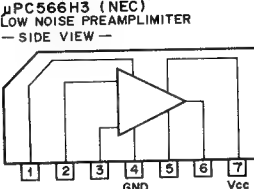
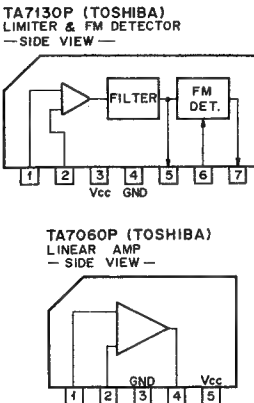
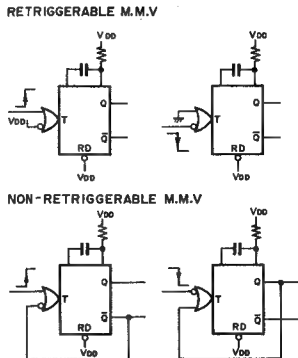
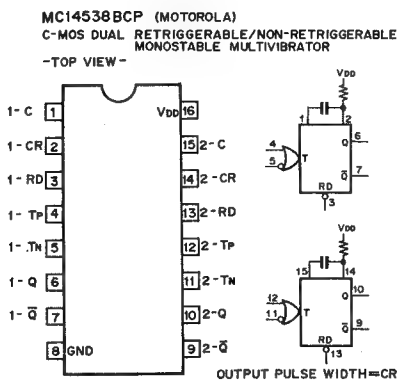
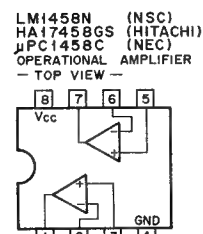


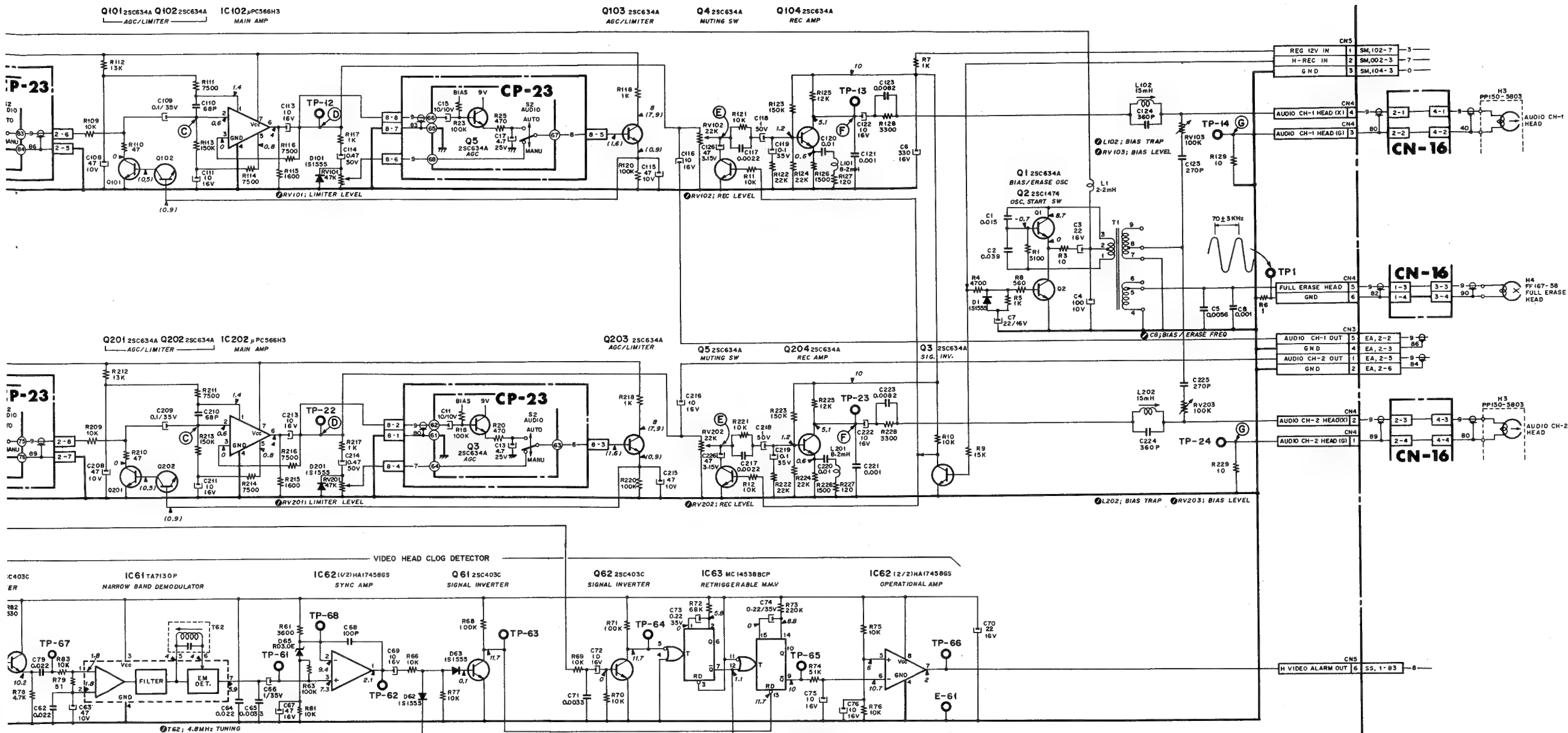


AR-8 (AUDIO RECORD AMP)
(TIME CODE RECORD AMP)
(VIDEO HEAD CLOG DETECTOR)



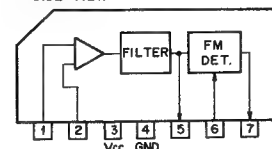
AR-8



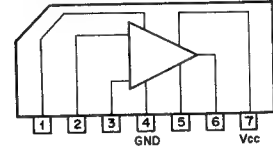


AR-8

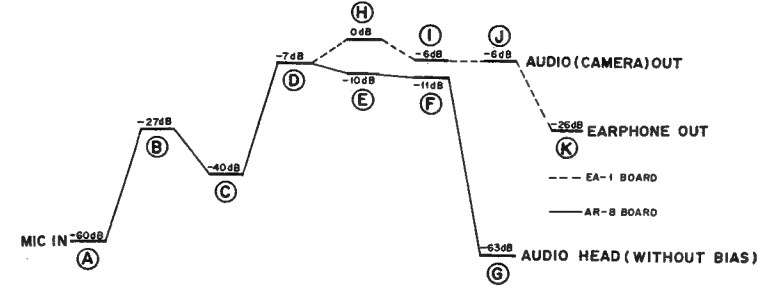
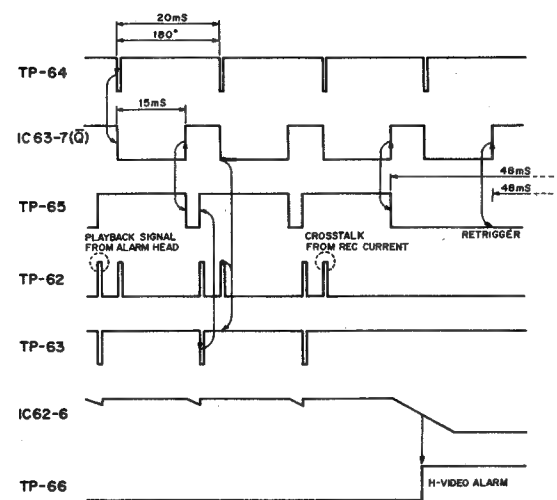
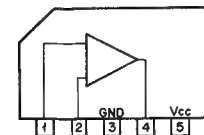
TA7130P (TOSHIBA)
LIMITER & FM DETECTOR
—SIDE VIEW—



μPC566H3 (NEC)
LOW NOISE PREAMPLIFIER
—SIDE VIEW—



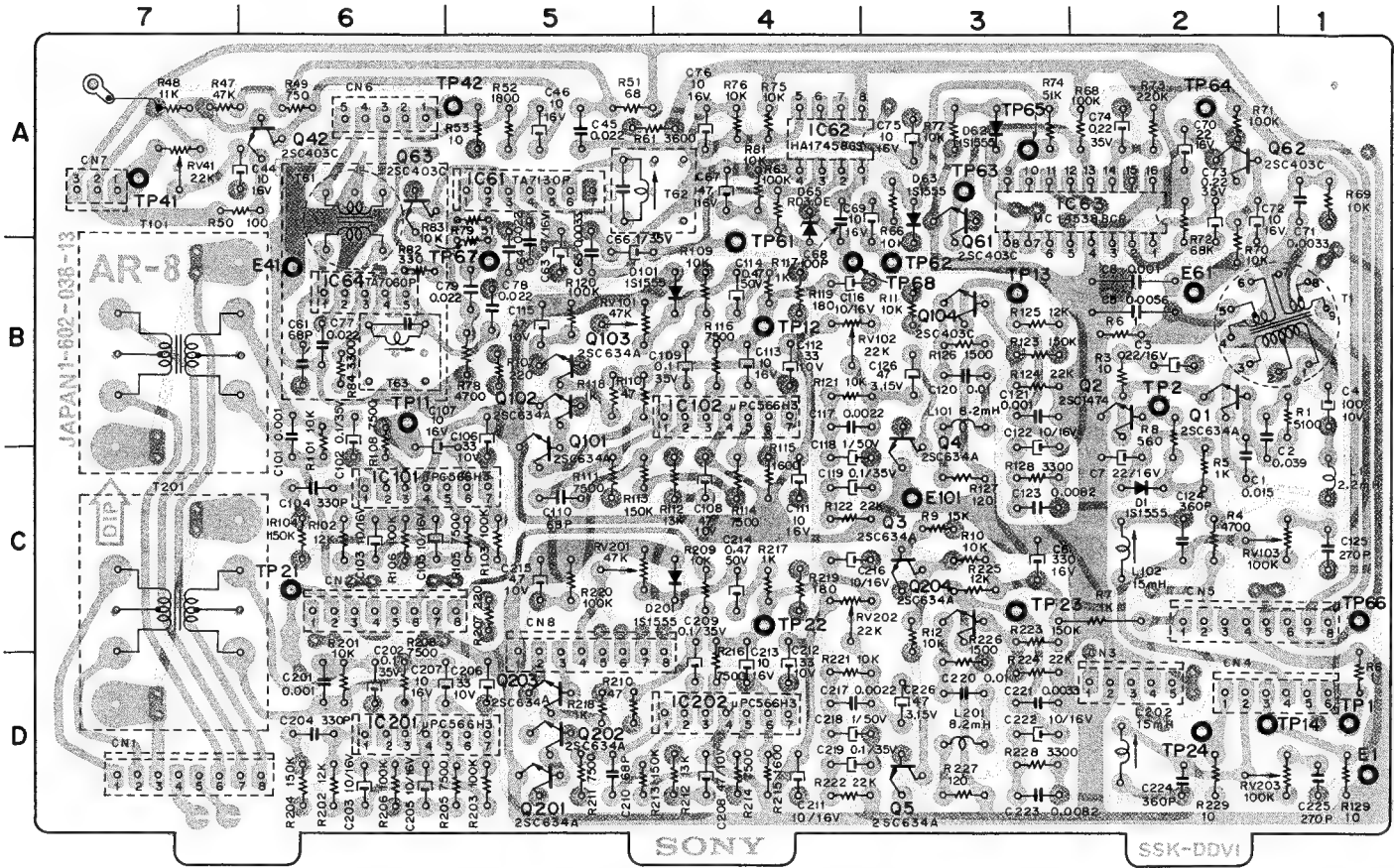
TA7060P (TOSHIBA)
LINEAR AMP
—SIDE VIEW—



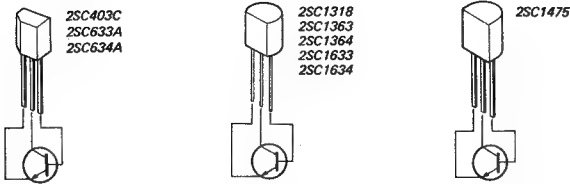
AR-8 (AUDIO RECORD AMP)
(TIME CODE RECORD AMP)
(VIDEO HEAD CLOG DETECTOR)

SER. No. Up to 10475 (PAL)
SER. No. Up to 10055 (SECAM)

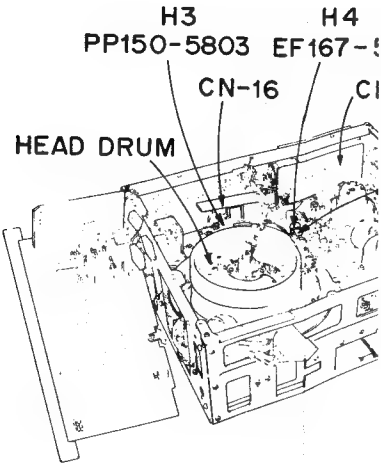
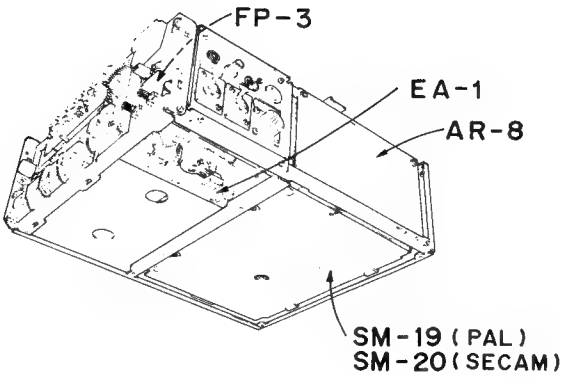
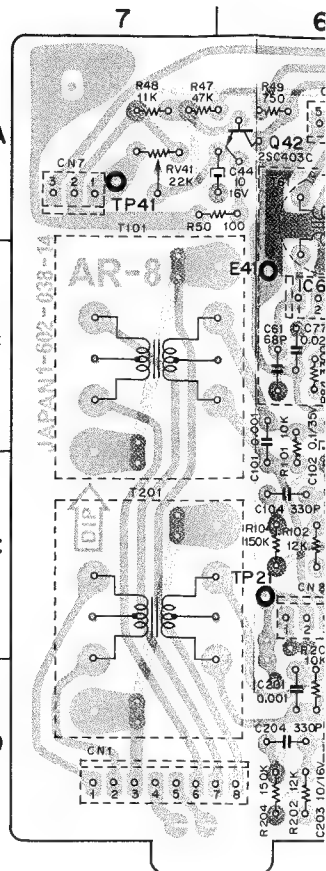
SER. No. 10476 and higher (PAL)
SER. No. 10056 and higher (SECAM)



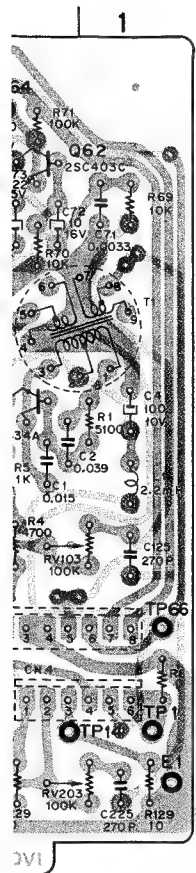
AR-8 - SOLDERING SIDE-



CN1	7 - D	Q101	5 - B
CN2	6 - C	Q102	5 - B
CN3	2 - D	Q103	5 - B
CN4	2 - D	Q104	3 - B
CN5	2 - C	Q201	5 - D
CN6	6 - A	Q202	5 - D
CN7	7 - A	Q203	5 - D
		Q204	3 - C
D1	2 - C	RV41	7 - A
D62	3 - A	RV101	5 - B
D63	3 - A	RV102	4 - B
D65	4 - A	RV103	2 - C
D101	4 - B	RV201	5 - C
D201	4 - C	RV202	4 - C
		RV203	2 - D
E1	1 - D	T62	4 - A
E41	6 - B	T63	6 - B
E61	2 - B		
E101	3 - C		
IC61	5 - A	TP1	1 - D
IC62	4 - A	TP2	2 - B
IC63	2 - A	TP11	6 - B
IC64	6 - B	TP12	4 - B
IC101	6 - C	TP13	3 - B
IC102	4 - B	TP14	2 - D
IC201	6 - D	TP21	6 - C
IC202	4 - D	TP22	4 - C
		TP23	3 - C
L102	2 - C	TP24	2 - D
L202	2 - D	TP41	7 - A
		TP42	5 - A
Q1	2 - B	TP61	4 - A
Q2	2 - B	TP62	3 - B
Q3	3 - C	TP63	3 - A
Q4	3 - B	TP64	2 - A
Q5	3 - D	TP65	3 - A
Q42	6 - A	TP66	1 - C
Q61	3 - A	TP67	5 - B
Q62	2 - A	TP68	4 - B
Q63	6 - A		

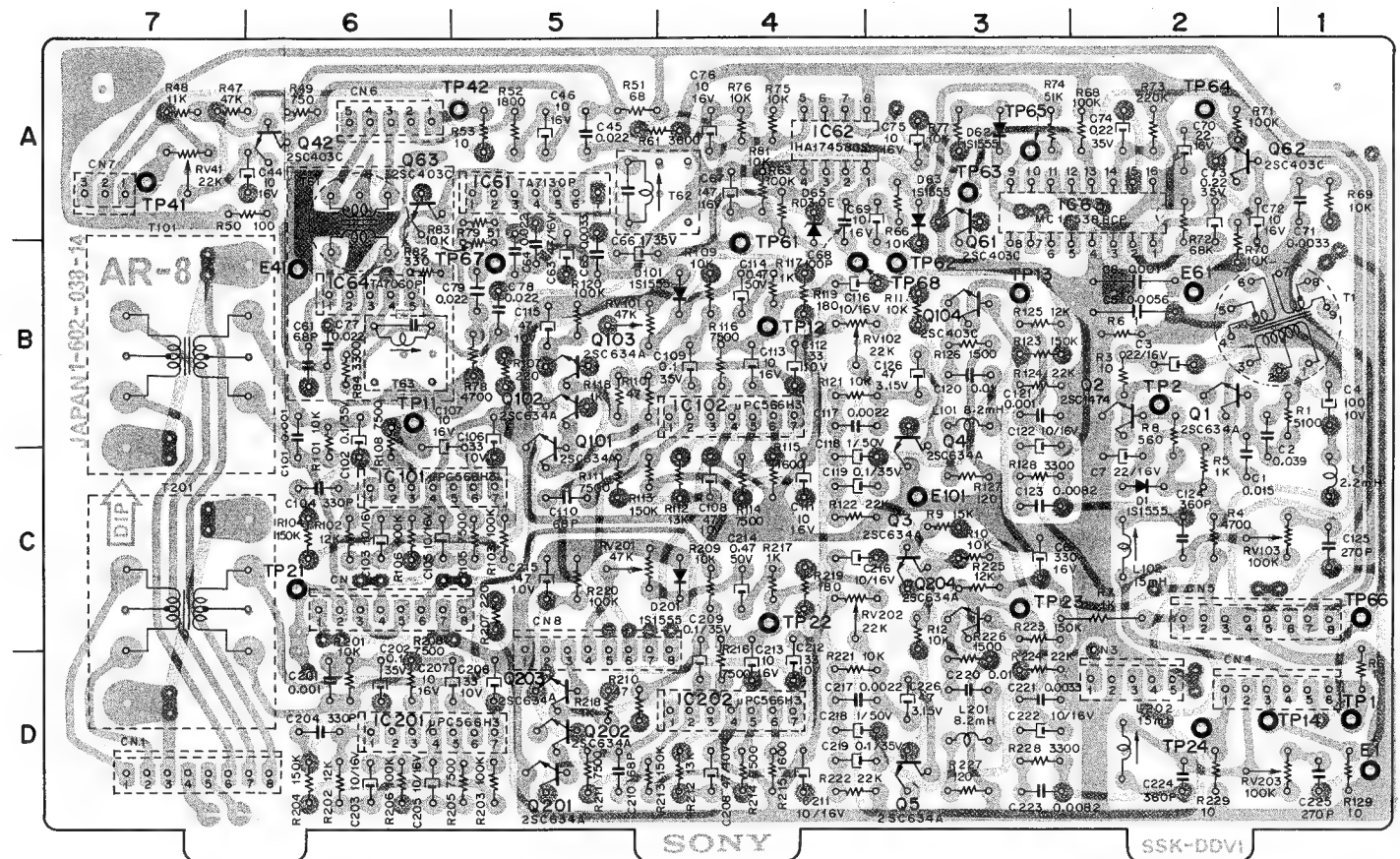


SER. No. 10476 and higher (PAL)
SER. No. 10056 and higher (SECAM)

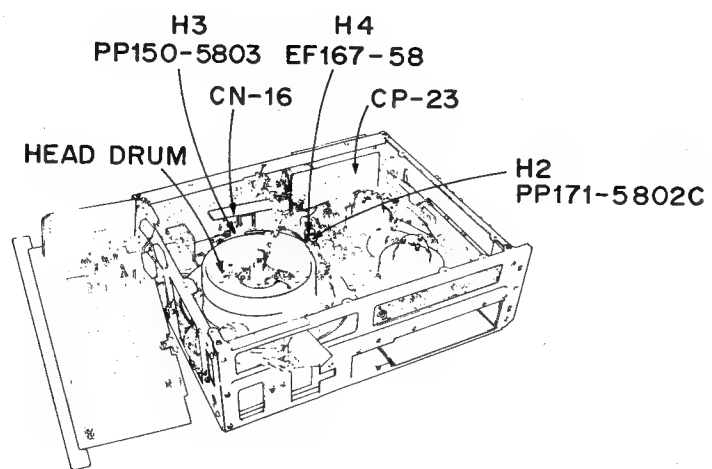
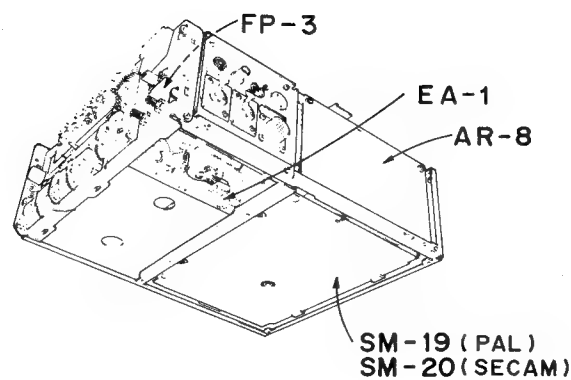
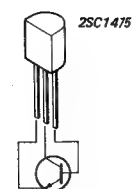


G SIDE-

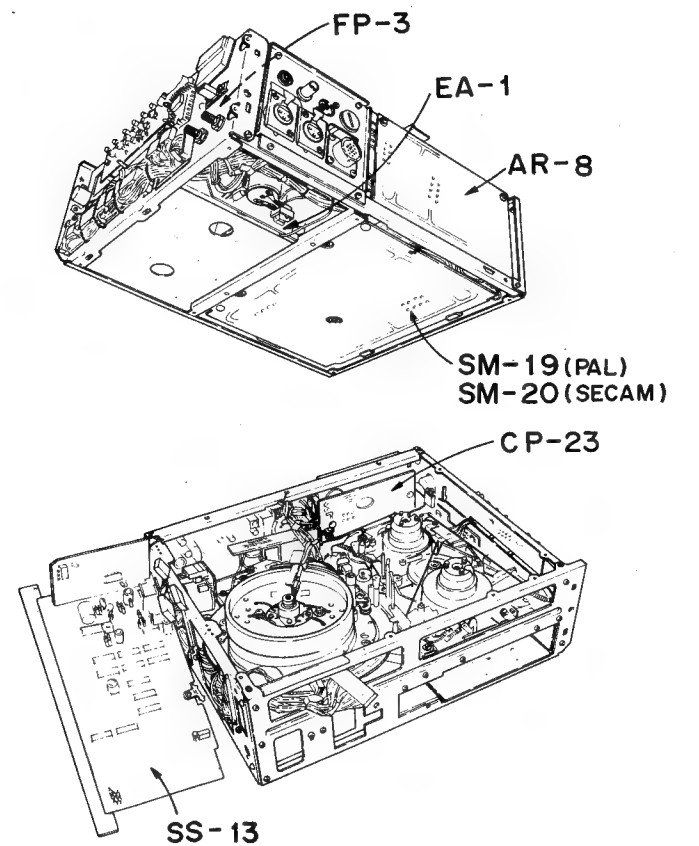
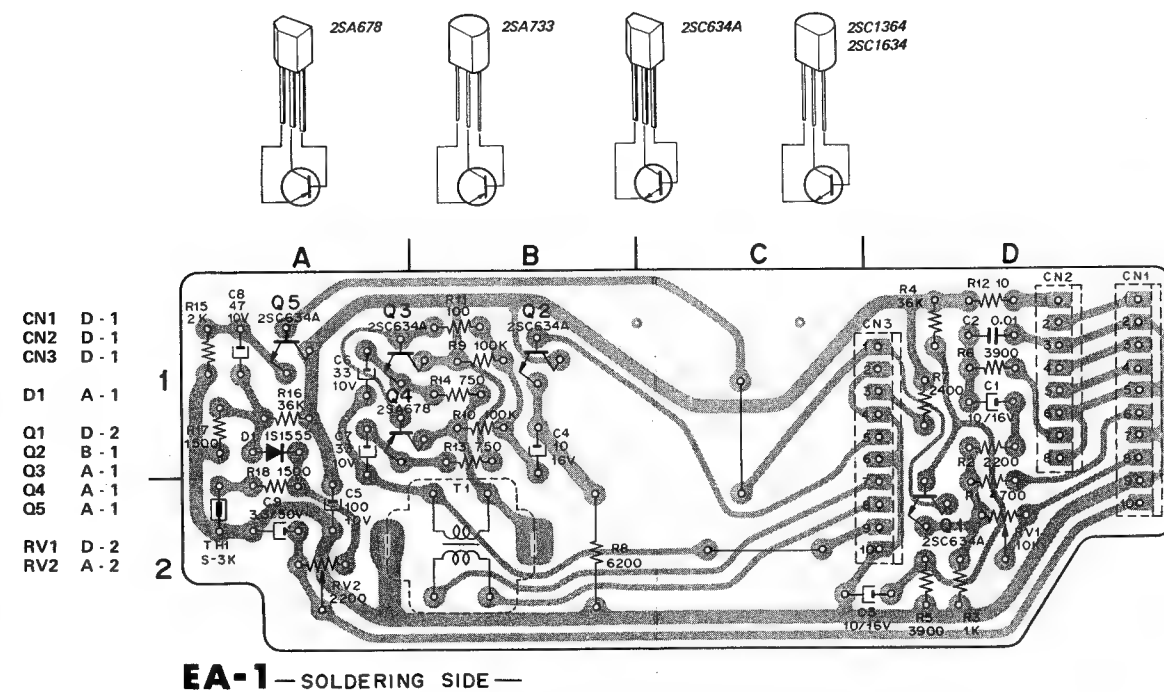
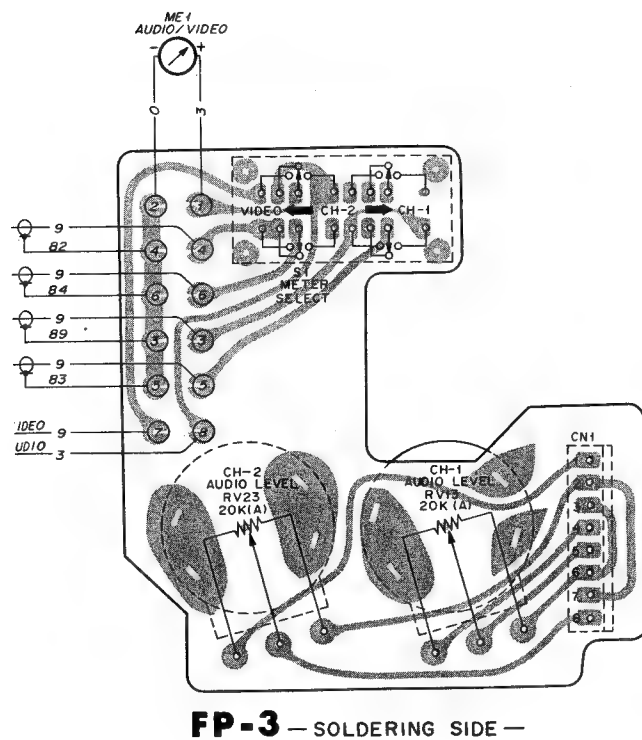
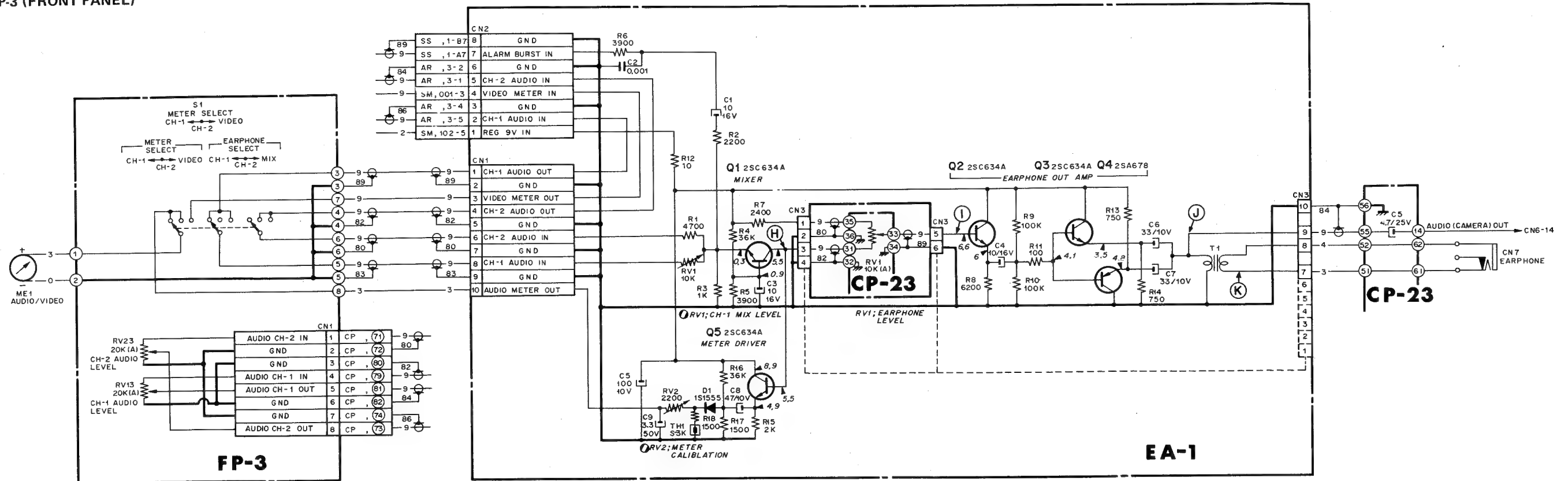
CN1	7 - D	Q101	5 - B
CN2	6 - C	Q102	5 - B
CN3	2 - D	Q103	5 - B
CN4	2 - D	Q104	3 - B
CN5	2 - C	Q201	5 - D
CN6	6 - A	Q202	5 - D
CN7	7 - A	Q203	5 - D
		Q204	3 - C
D1	2 - C	RV41	7 - A
D62	3 - A	RV101	5 - B
D63	3 - A	RV102	4 - B
D65	4 - A	RV103	2 - C
D101	4 - B	RV201	5 - C
D201	4 - C	RV202	4 - C
		RV203	2 - D
E1	1 - D	T62	4 - A
E41	6 - B	T63	6 - B
E61	2 - B		
E101	3 - C	TP1	1 - D
		TP2	2 - B
IC61	5 - A	TP11	6 - B
IC62	4 - A	TP12	4 - B
IC63	2 - A	TP13	3 - B
IC64	6 - B	TP14	2 - D
IC101	6 - C	TP21	6 - C
IC102	4 - B	TP22	4 - C
IC201	6 - D	TP23	3 - C
IC202	4 - D	TP24	2 - D
L102	2 - C	TP41	7 - A
L202	2 - D	TP42	5 - A
		TP61	4 - A
Q1	2 - B	TP62	3 - B
Q2	2 - B	TP63	3 - A
Q3	3 - C	TP64	2 - A
Q4	3 - B	TP65	3 - A
Q5	3 - D	TP66	1 - C
Q42	6 - A	TP67	5 - B
Q61	3 - A	TP68	4 - B
Q62	2 - A		
Q63	6 - A		



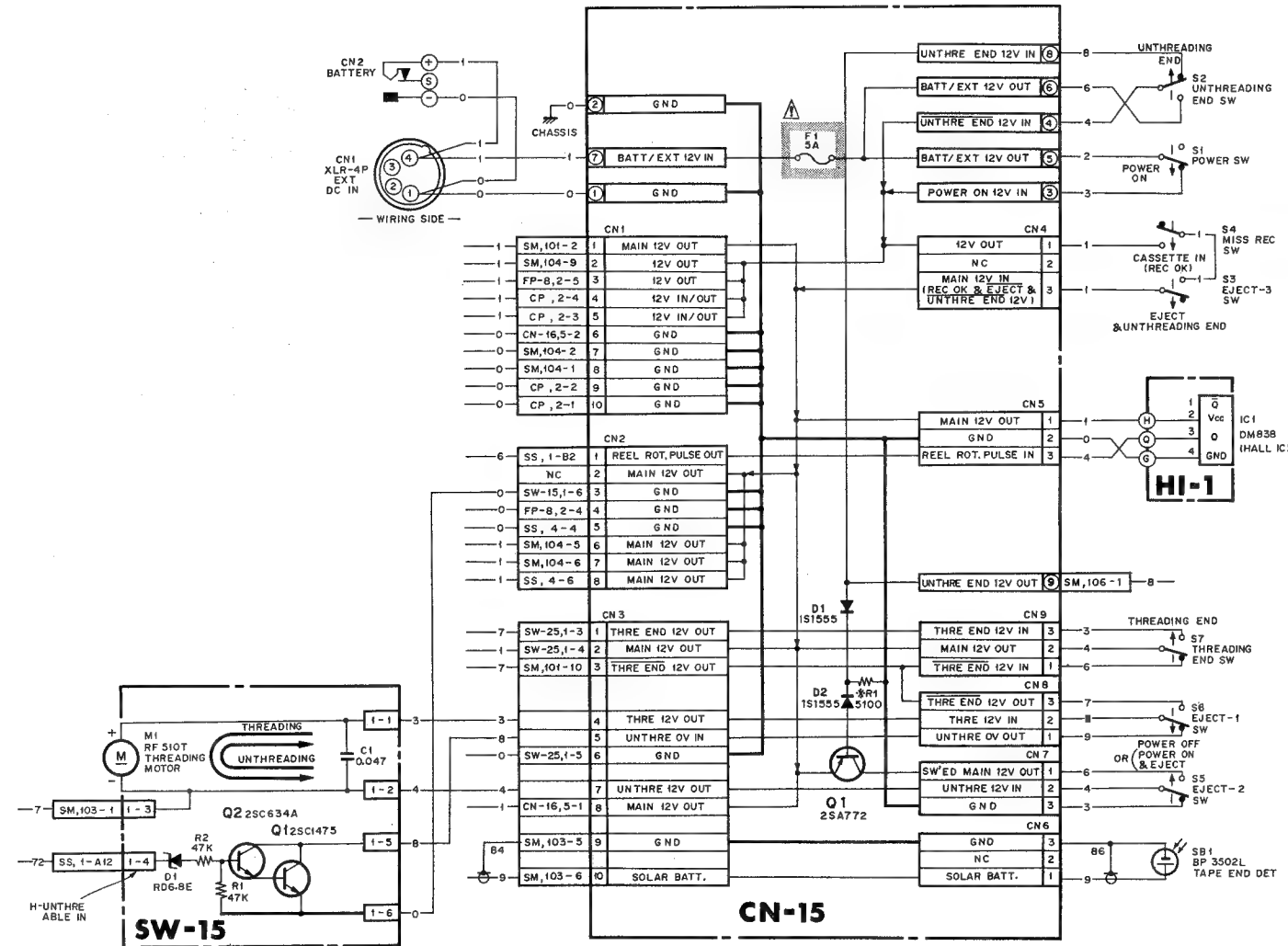
AR-8 - SOLDERING SIDE-



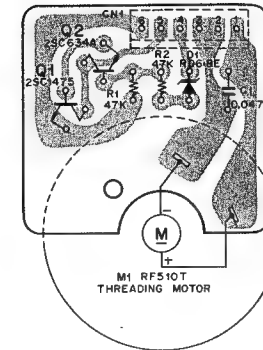
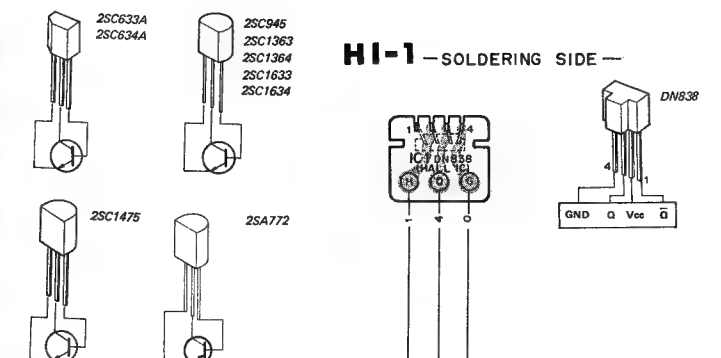
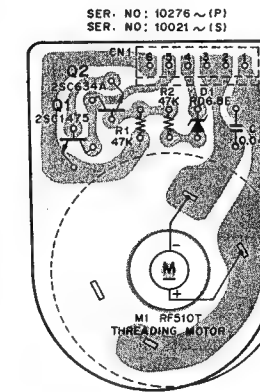
EA-1 (EARPHONE AMP)
FP-3 (FRONT PANEL)



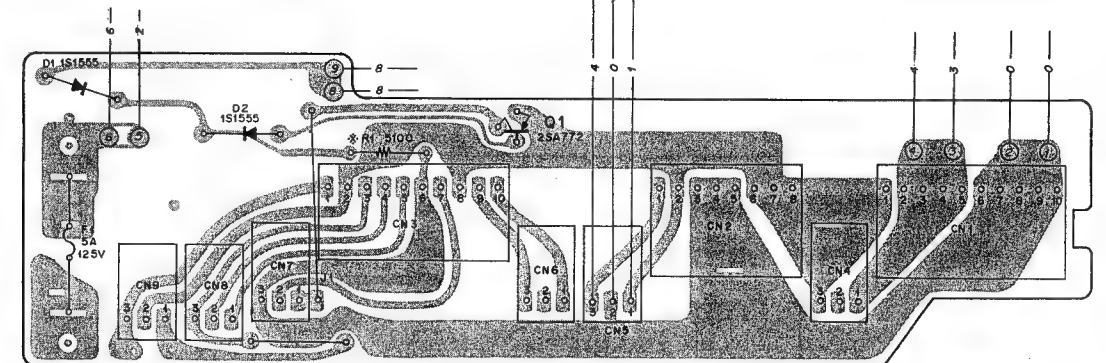
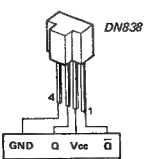
CN-15 (CONNECTION BOARD)
SW-15 (THREADING MOTOR CONTROL)
HI-1 (HALL IC BOARD)



SW-15-SOLDERING SIDE-
SER. NO: ~ 10275 (P)
SER. NO: ~ 10020 (S)

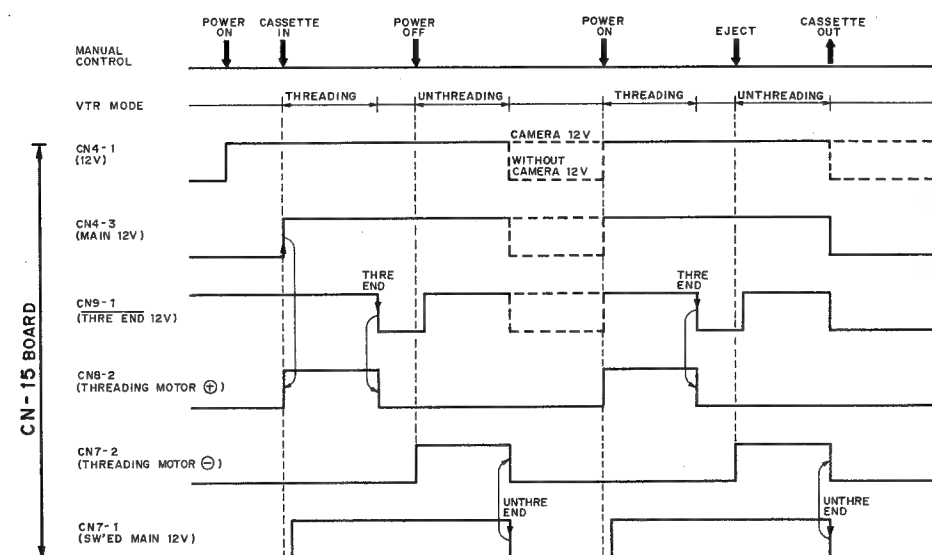
**SW-15** - SOLDERING SIDE -


H1-1—SOLDERING SIDE—

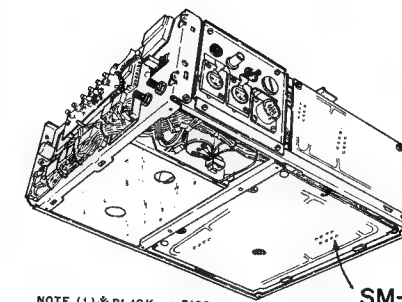
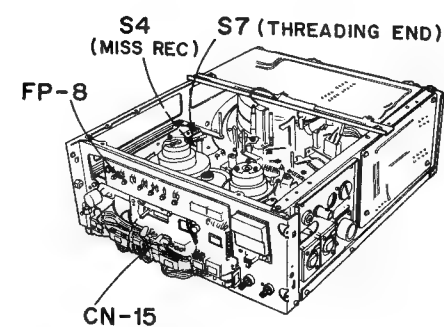


CN-15 — COMPONENT SIDE —

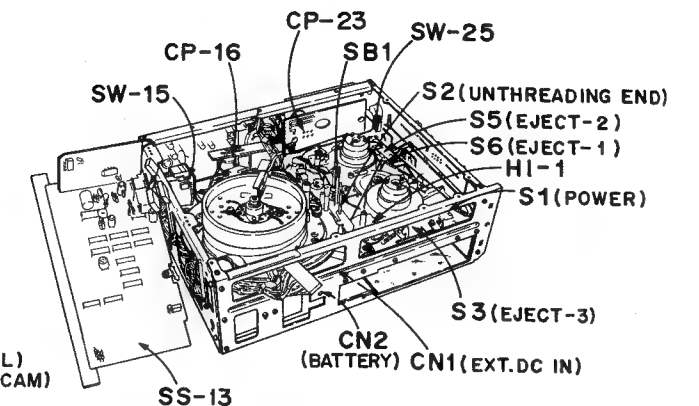
NOTE (1) * R1 10K → 5100
S/N. 10346 ~ (P)
S/N. 10046 ~ (S)



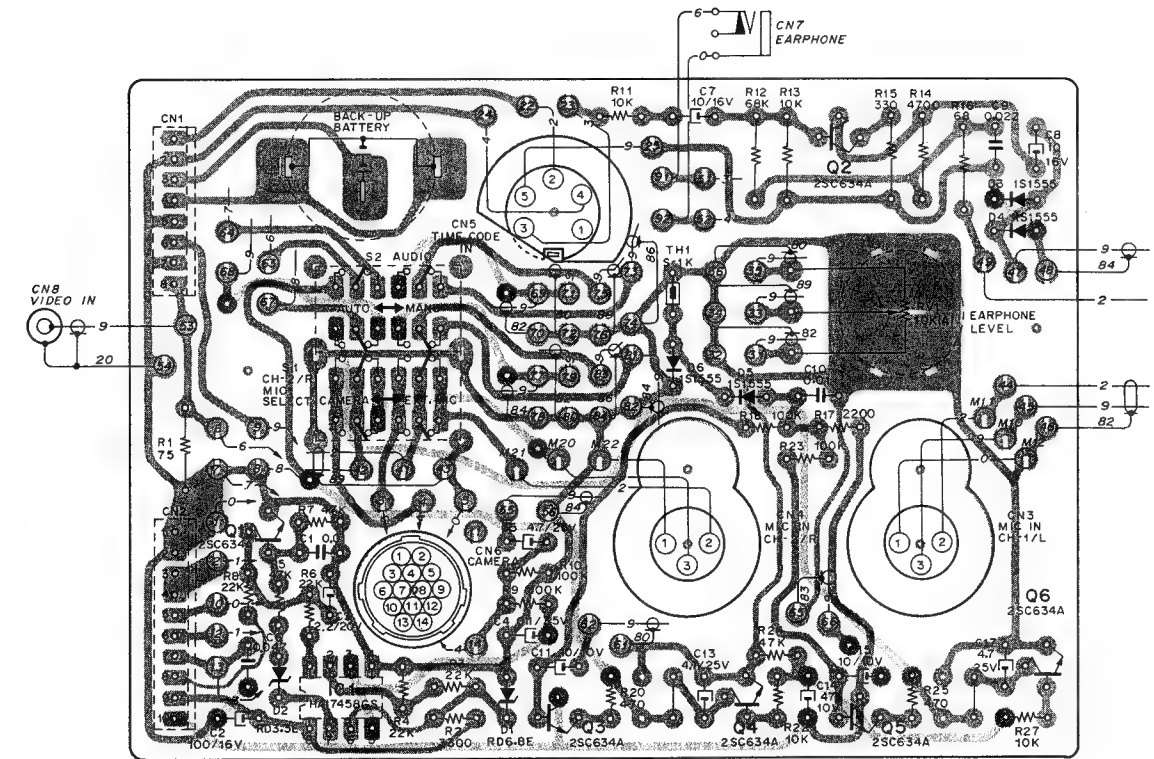
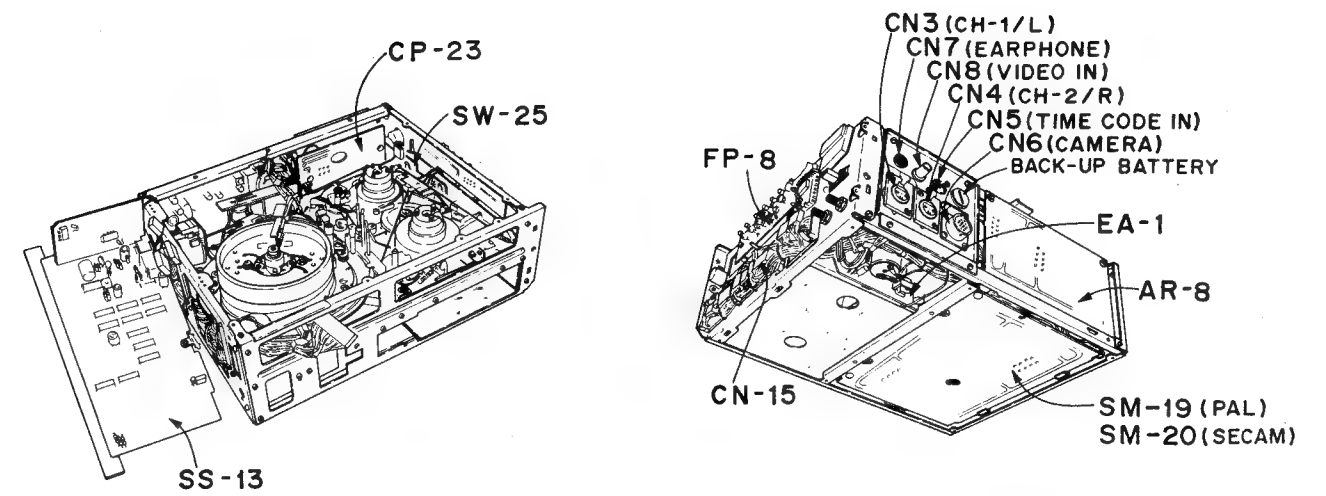
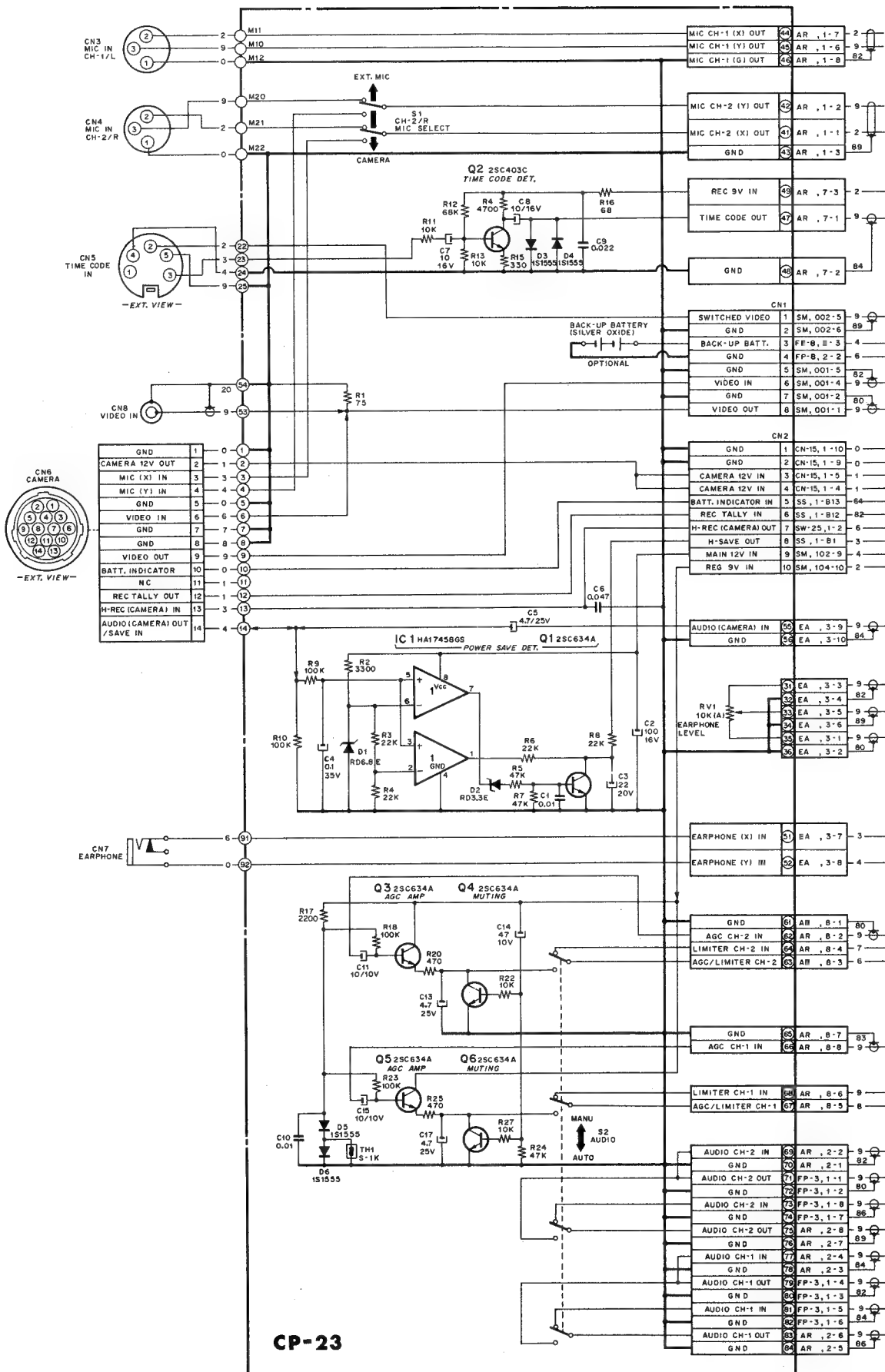
The shaded and -marked components are critical to safety.
Replace only with same components as specified.



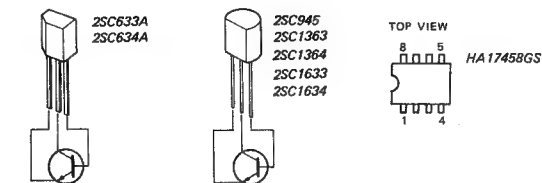
NOTE (1) * R1 10K → 5100
S/N.10346~(P)
S/N.10046~(S)



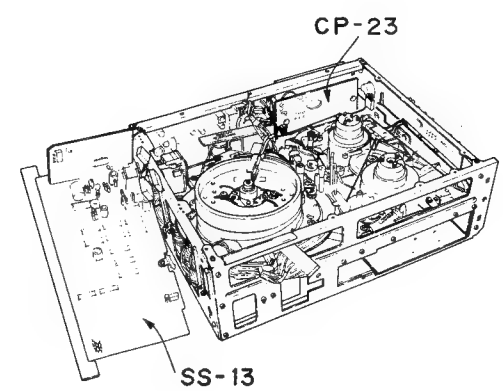
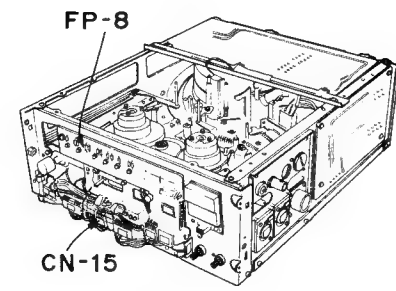
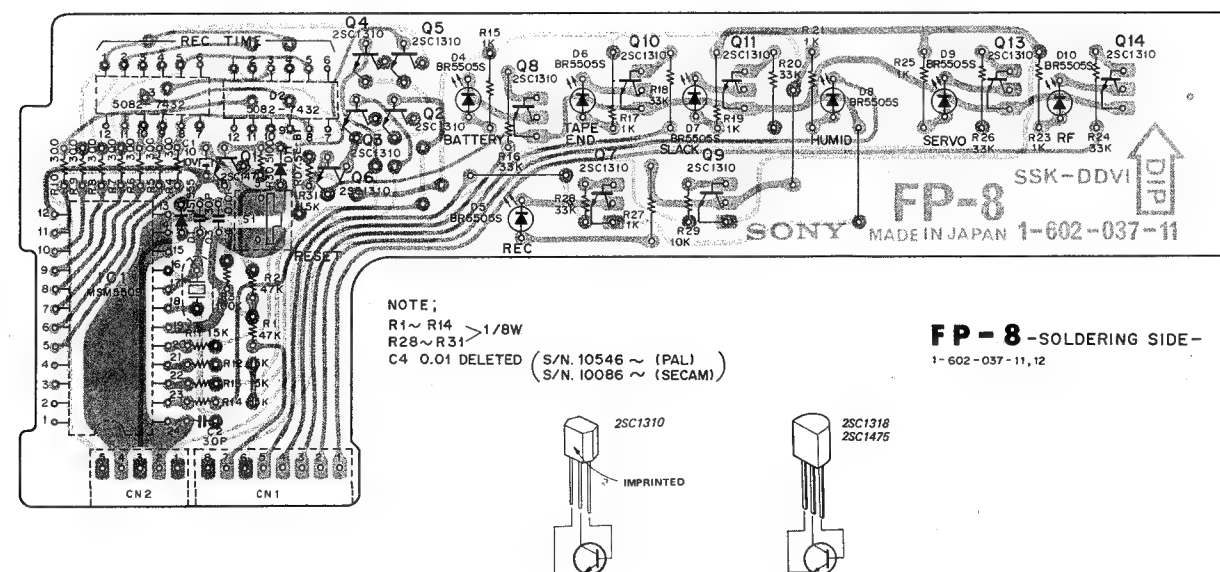
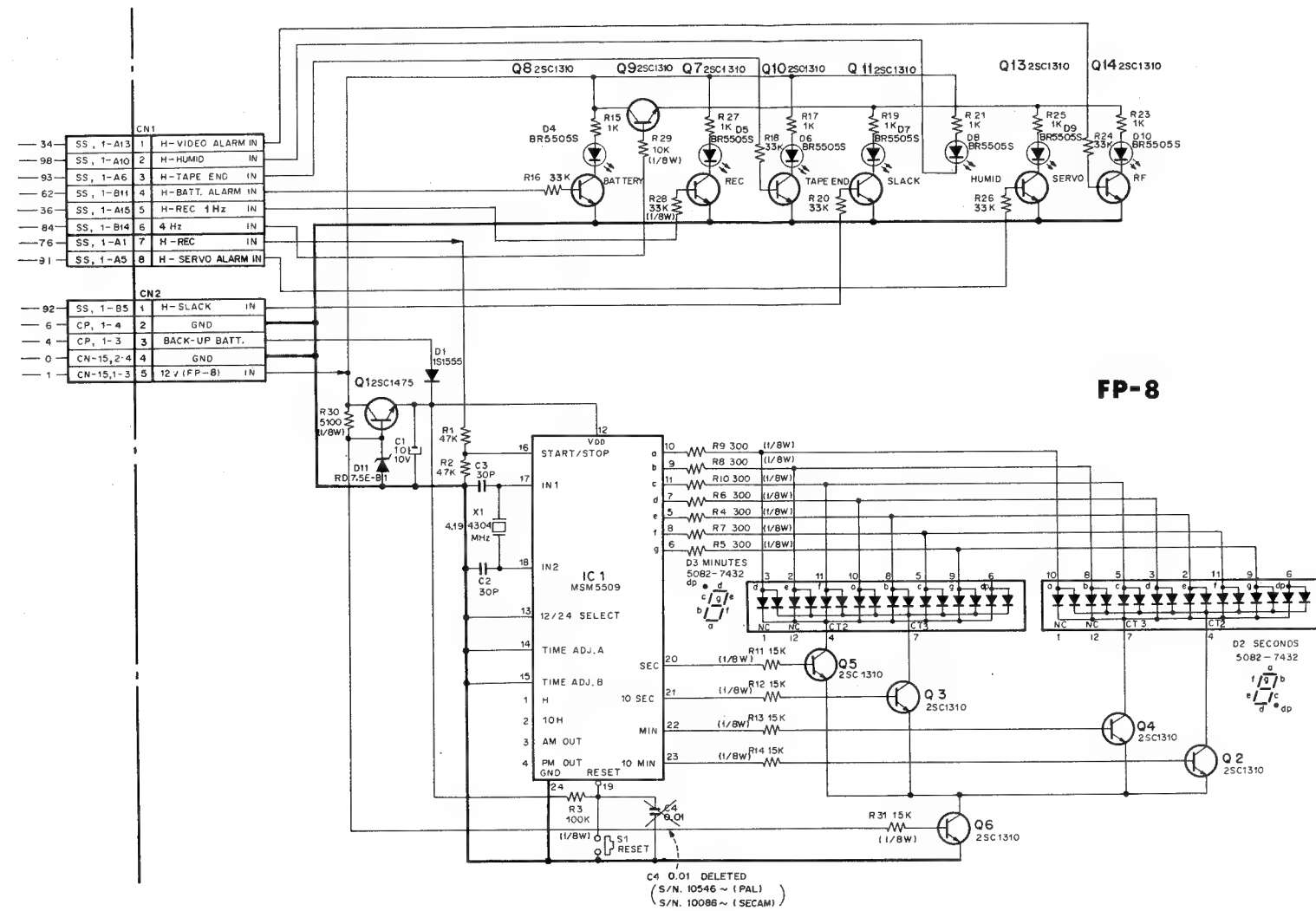
CP-23 (CONNECTOR PANEL)



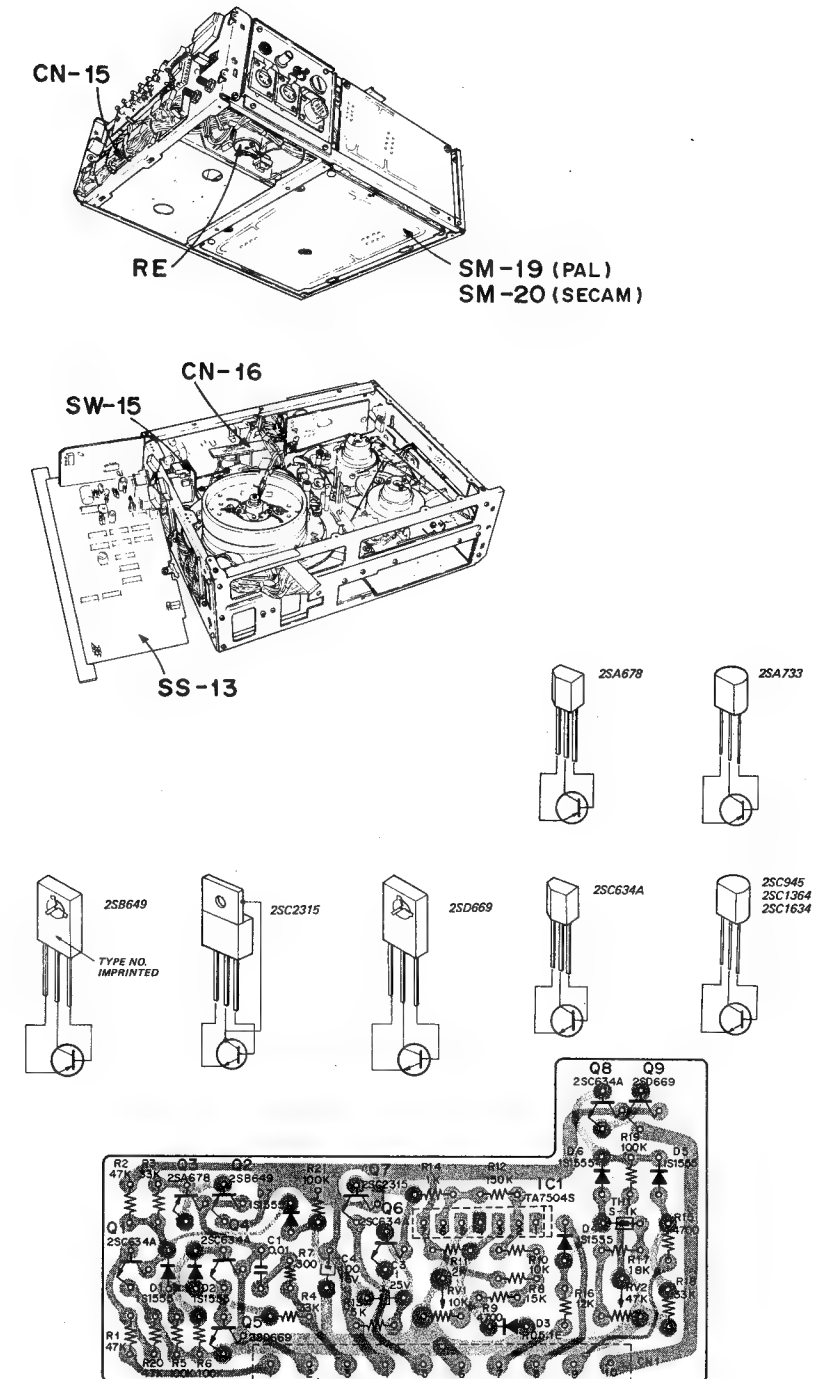
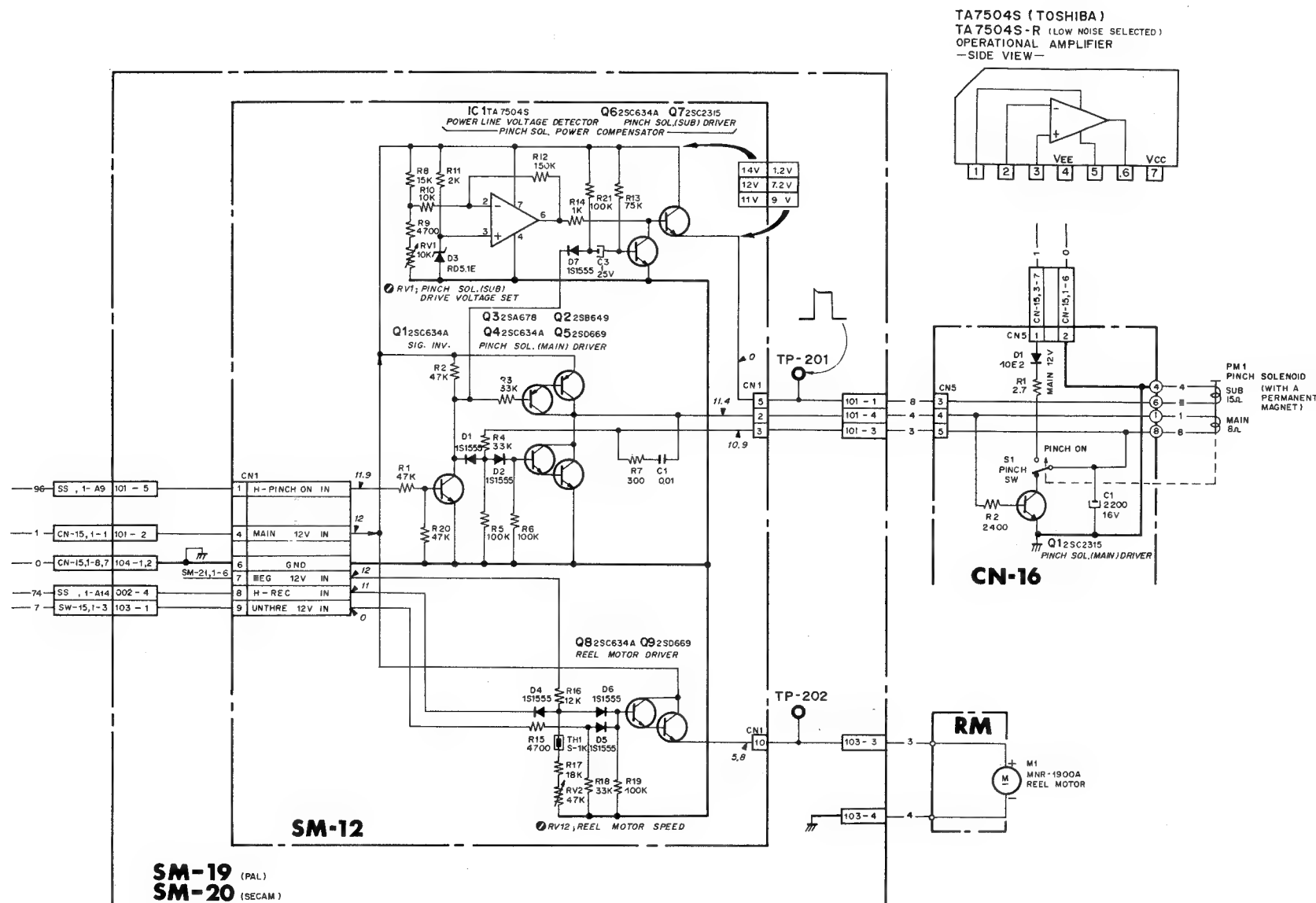
CP-23 — SOLDERING SIDE —



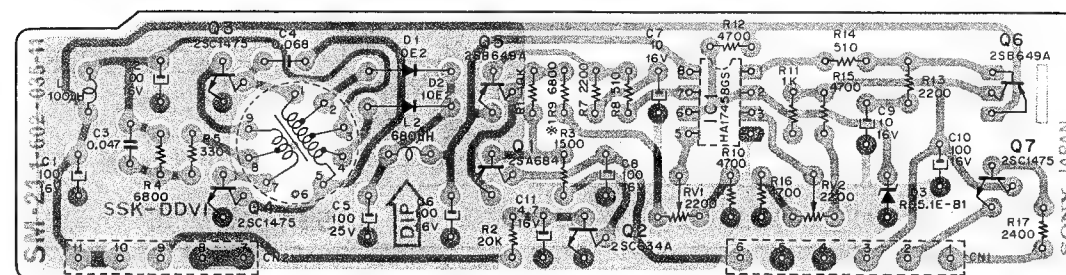
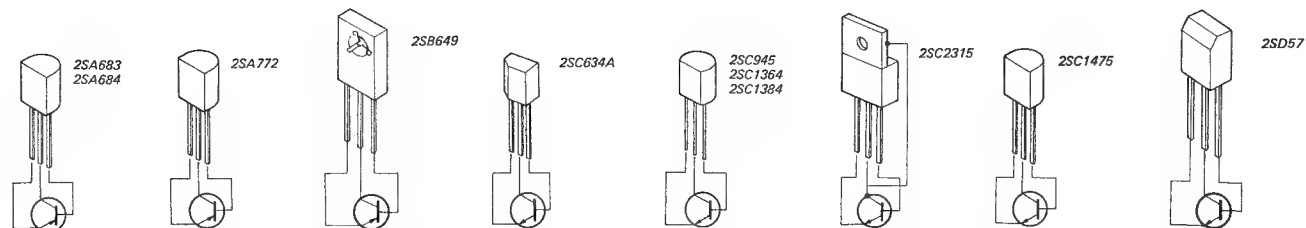
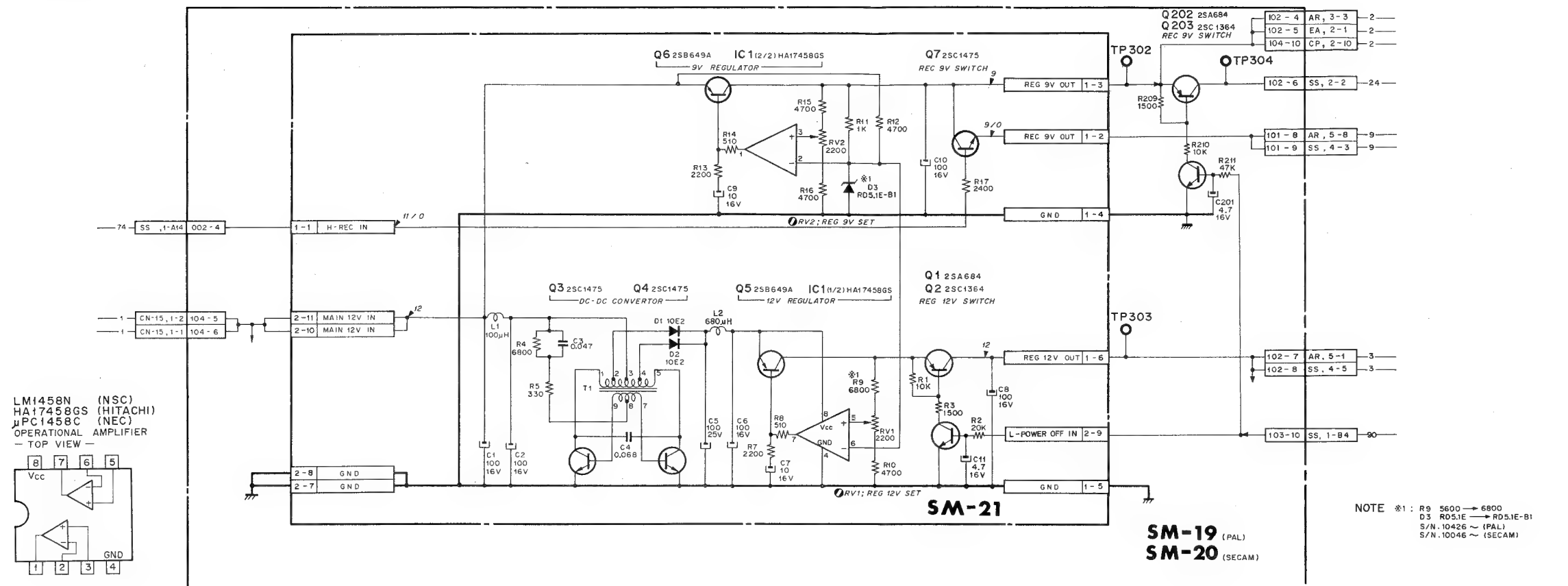
FP-8 (FRONT PANEL)



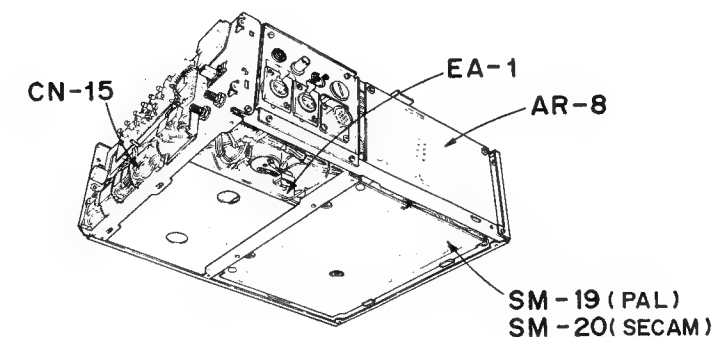
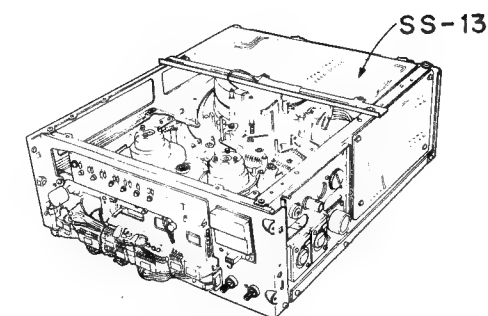
SM-12 (PINCH SOLENOID CONTROL)
(REEL MOTOR CONTROL)



SM-21 (POWER CONTROL)

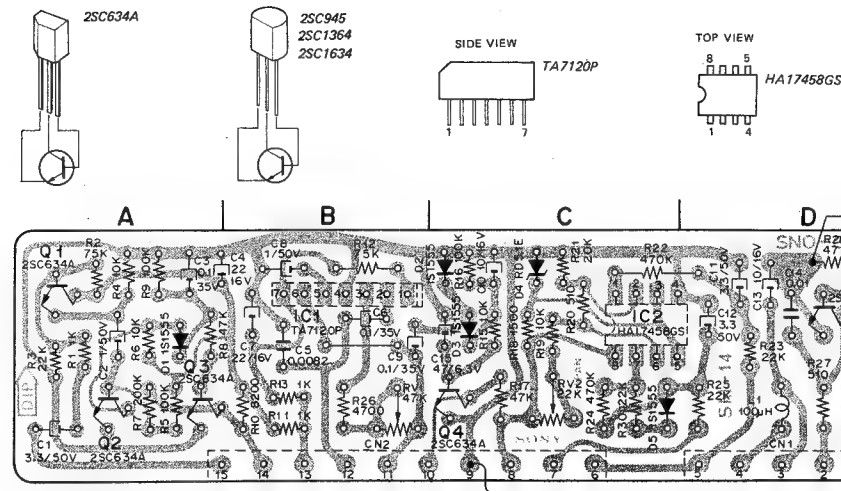
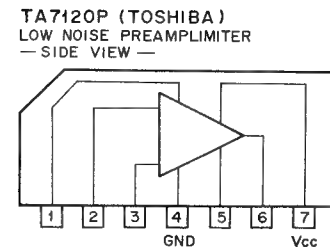
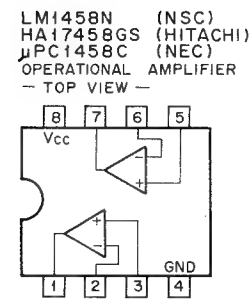
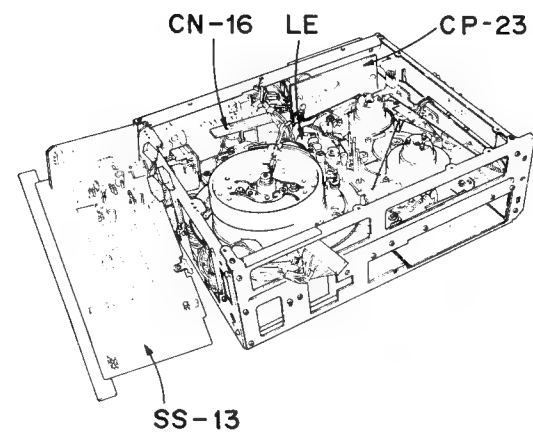
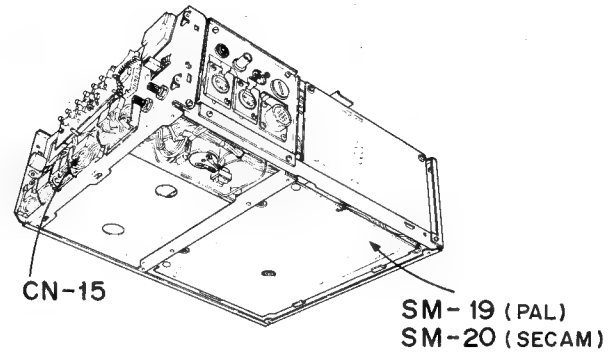


SM-21 -SOLDERING SIDE-



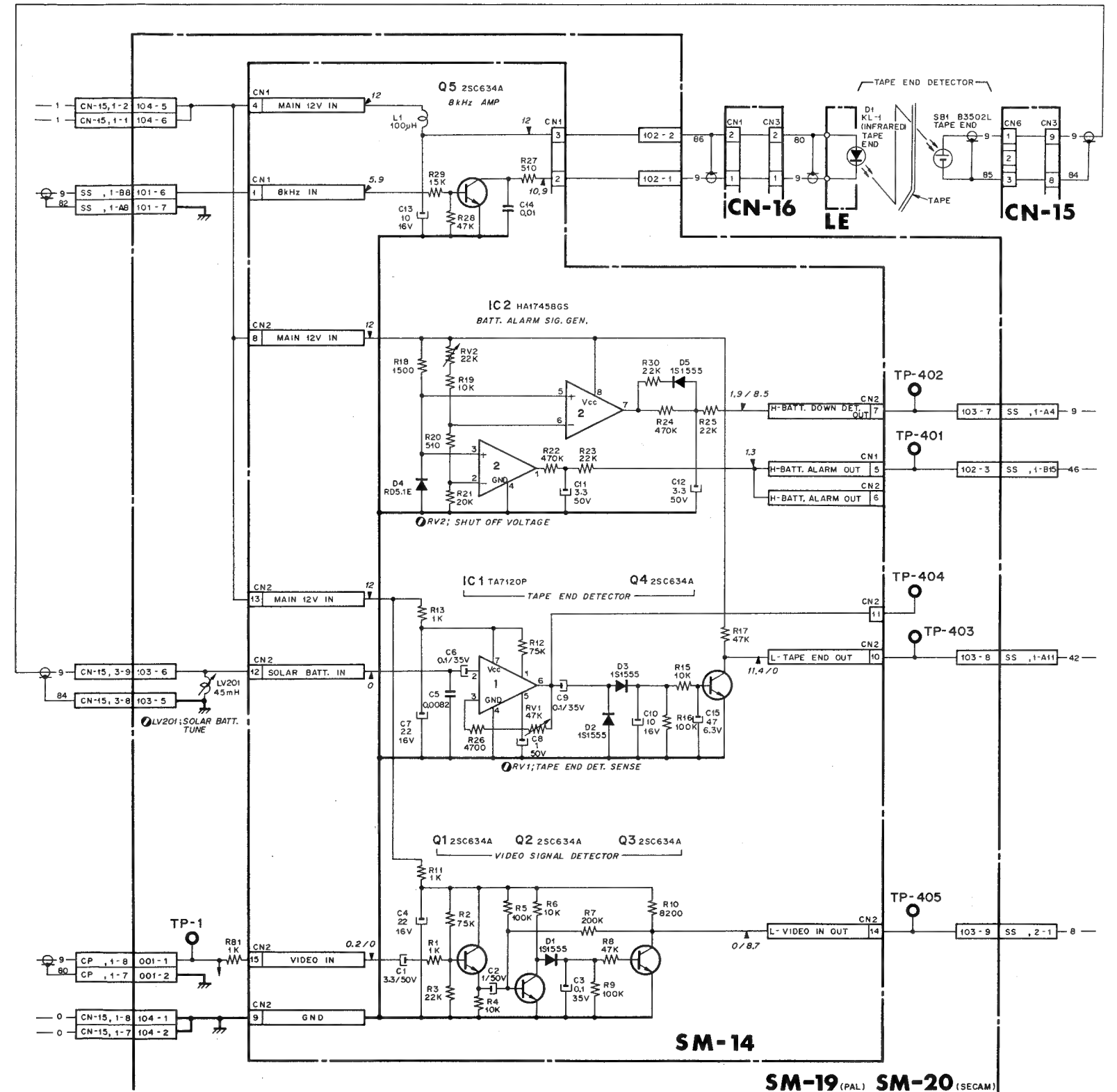
SM-19 (PAL)
SM-20 (SECAM)

SM-14 (BATTERY VOLTAGE DETECTOR)
(TAPE END DETECTOR)



SM-14 — SOLDERING SIDE —

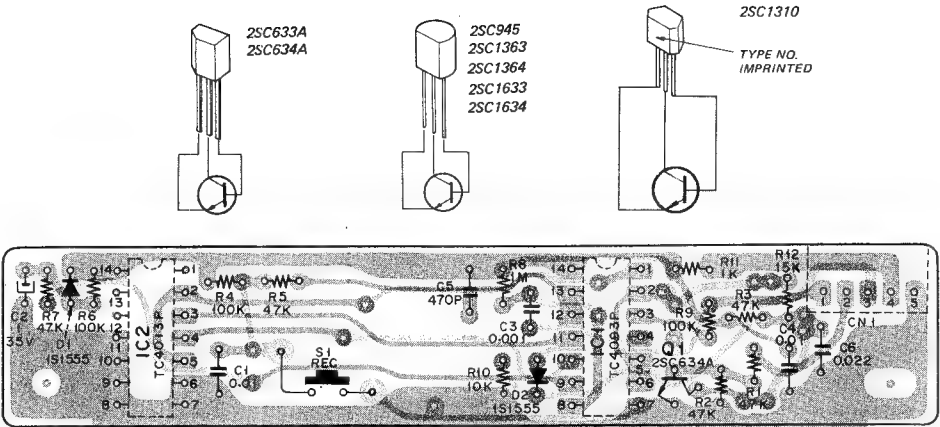
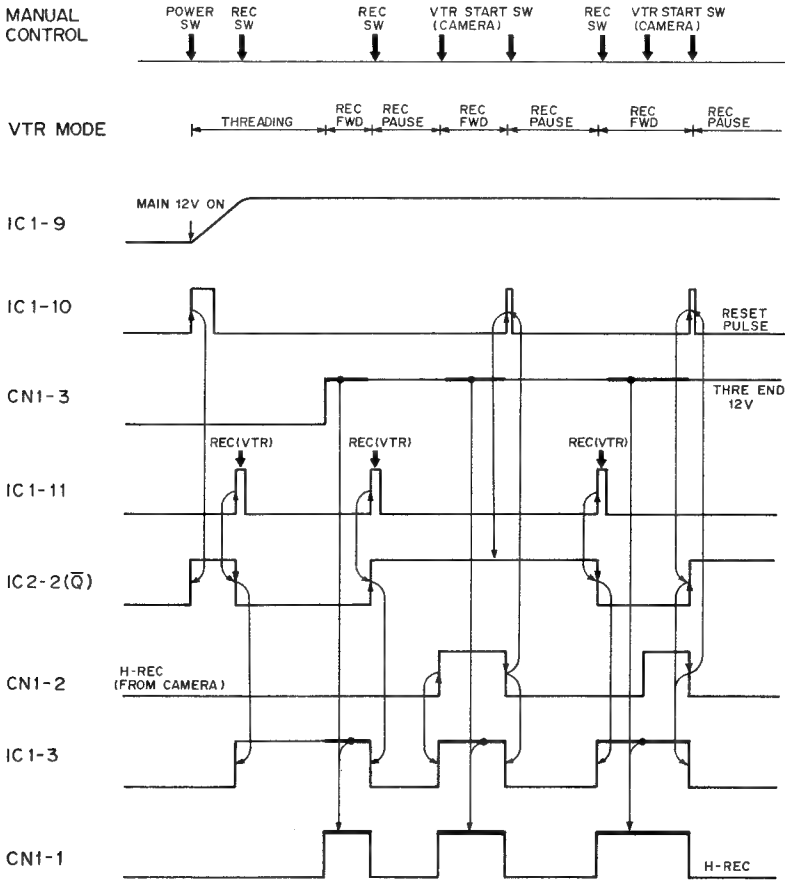
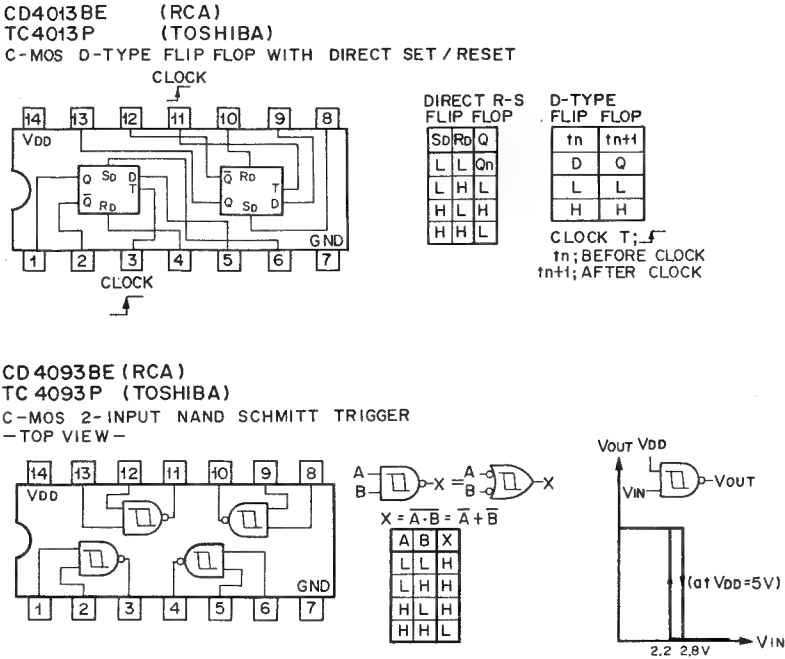
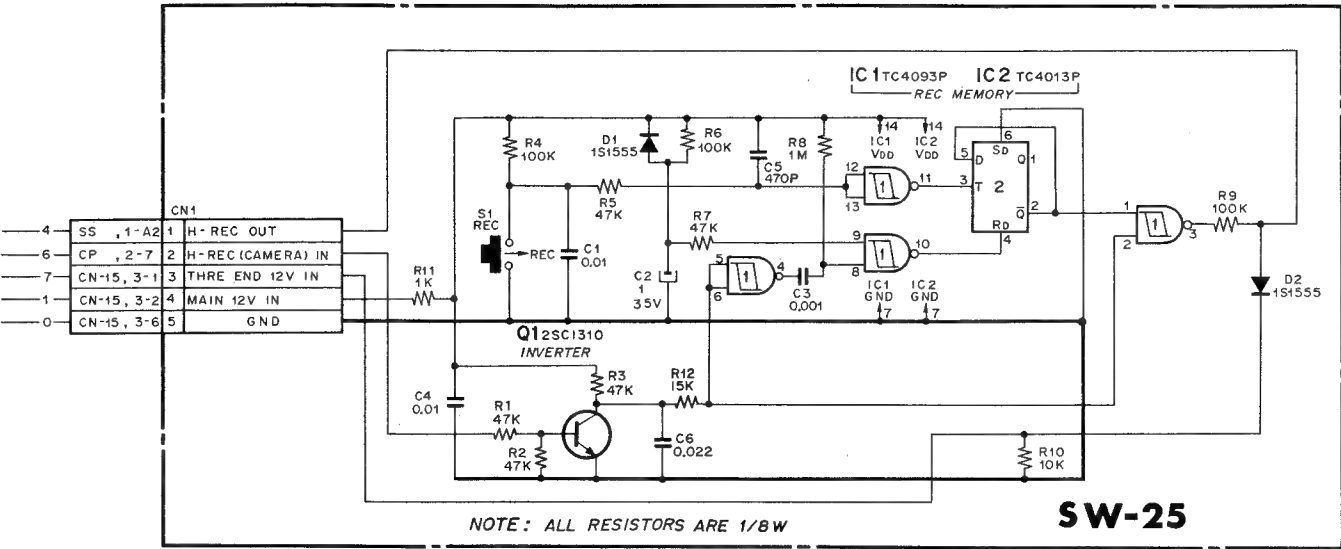
CN1 D
CN2 B,C
D1 A
D2 C
D3 C
D4 C
D5 C
IC1 B
IC2 C
Q1 A
Q2 A
Q3 A
Q4 C
Q5 D
RV1 B
RV2 C



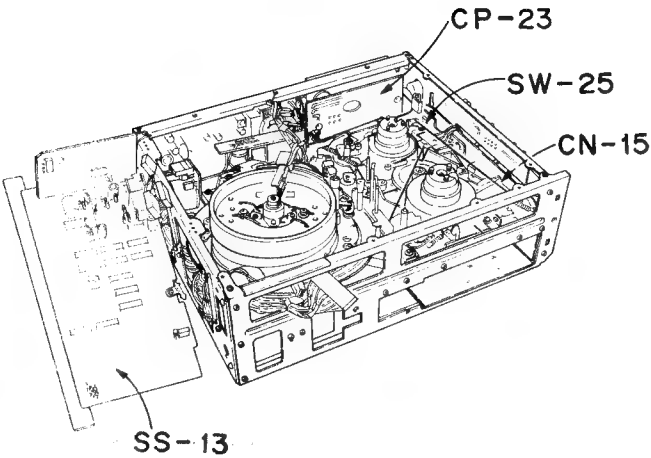
SM-14

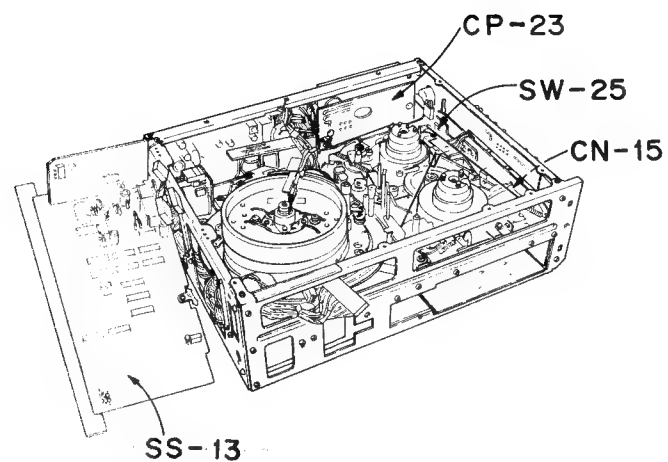
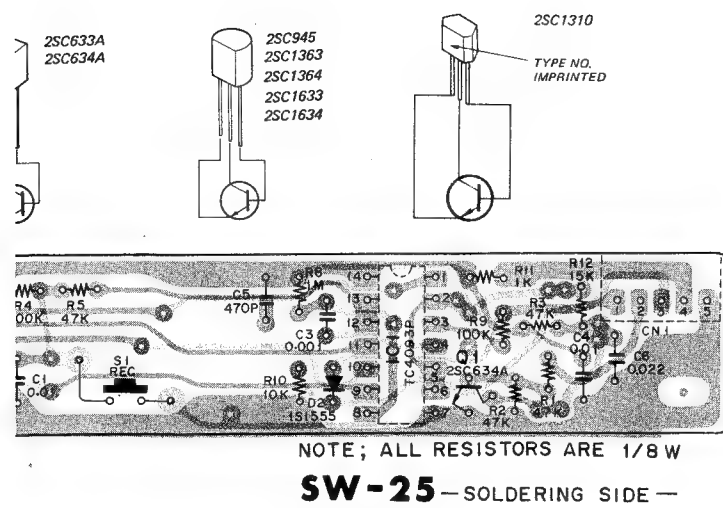
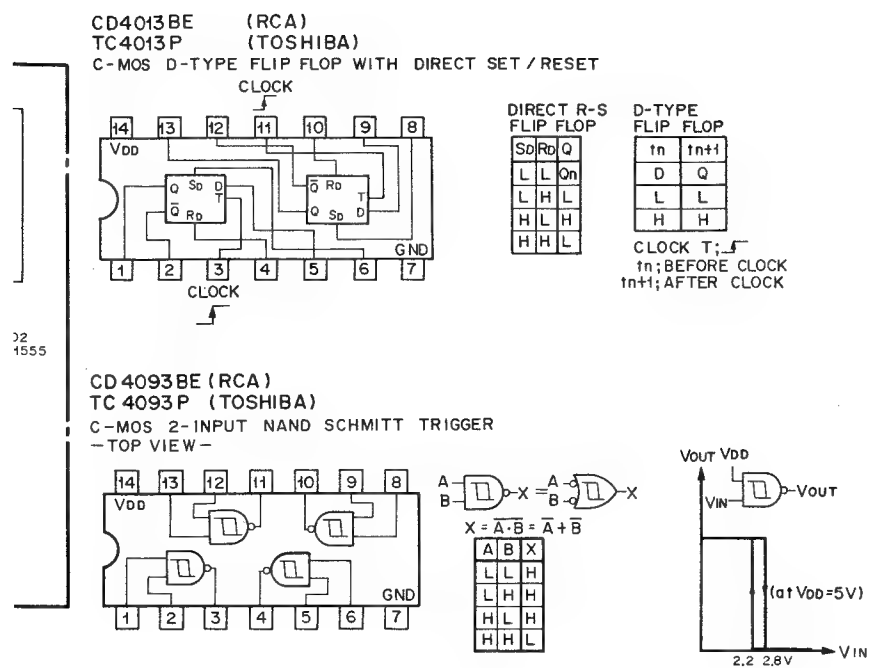
SM-19 (PAL) SM-20 (SECAM)

SW-25 (REC SIGNAL CONTROL)

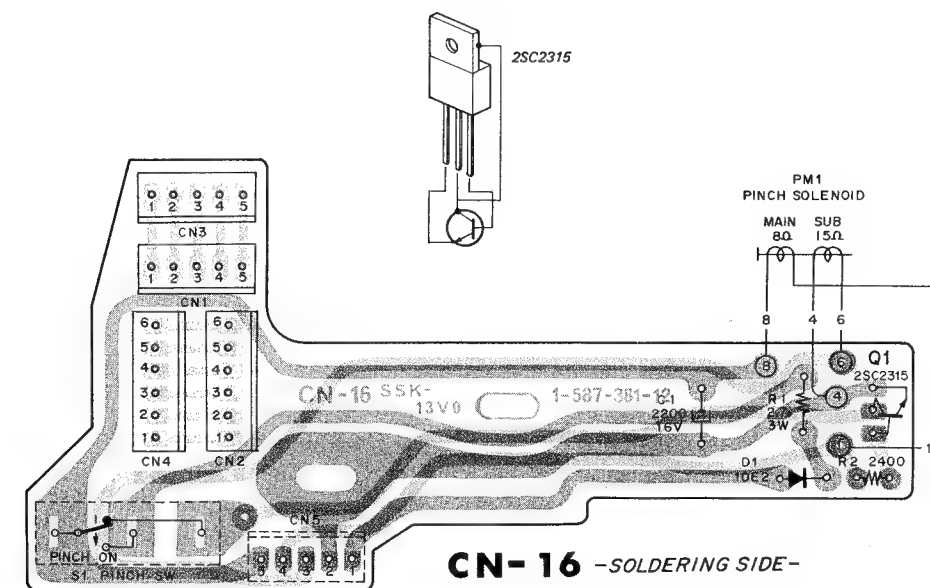
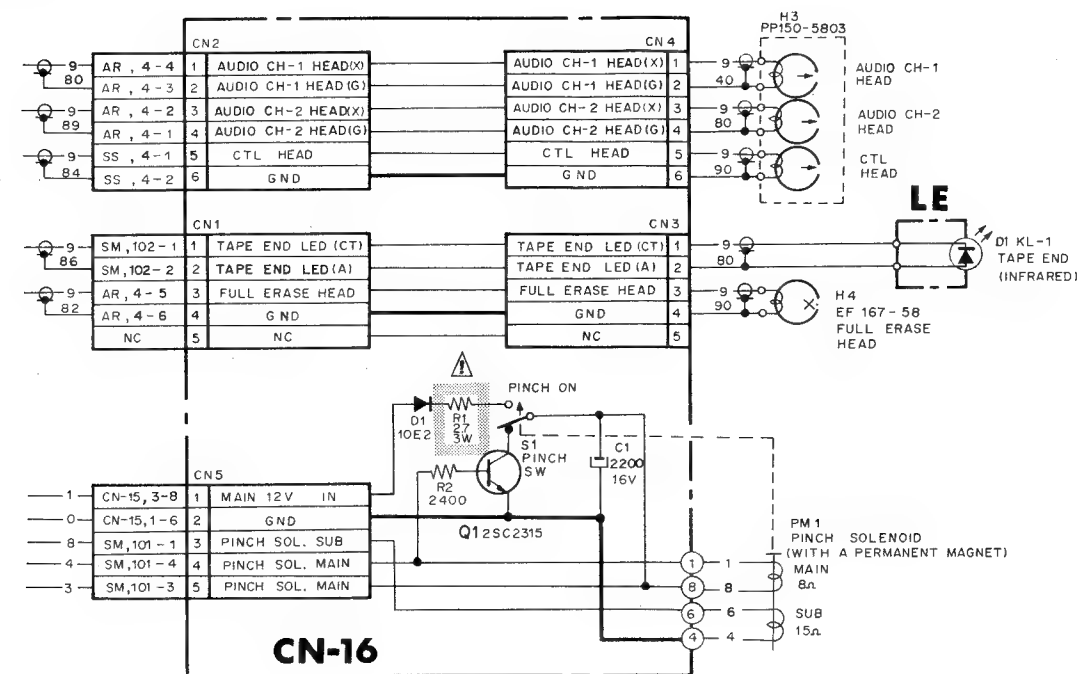



NOTE; ALL RESISTORS ARE 1/8W
SW-25—SOLDERING SIDE—





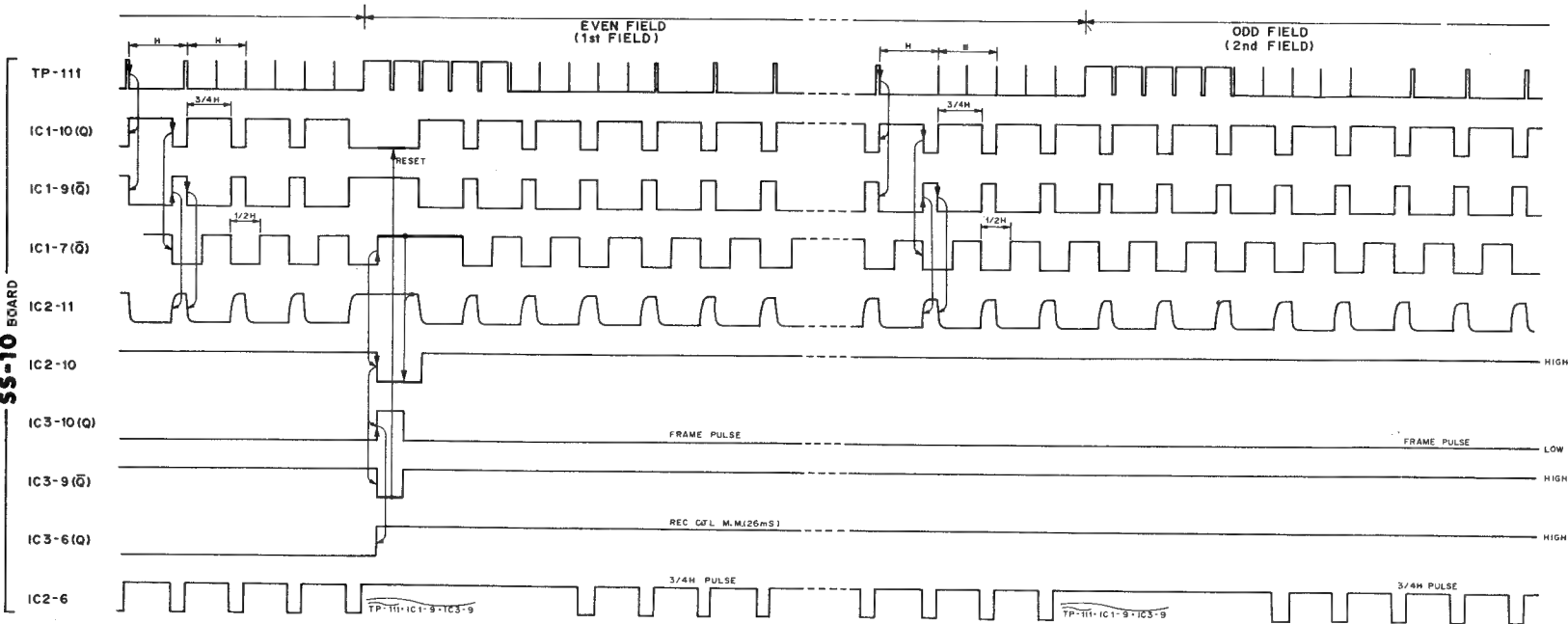
CN-16 (CONNECTION BOARD)
LE (LED BOARD)



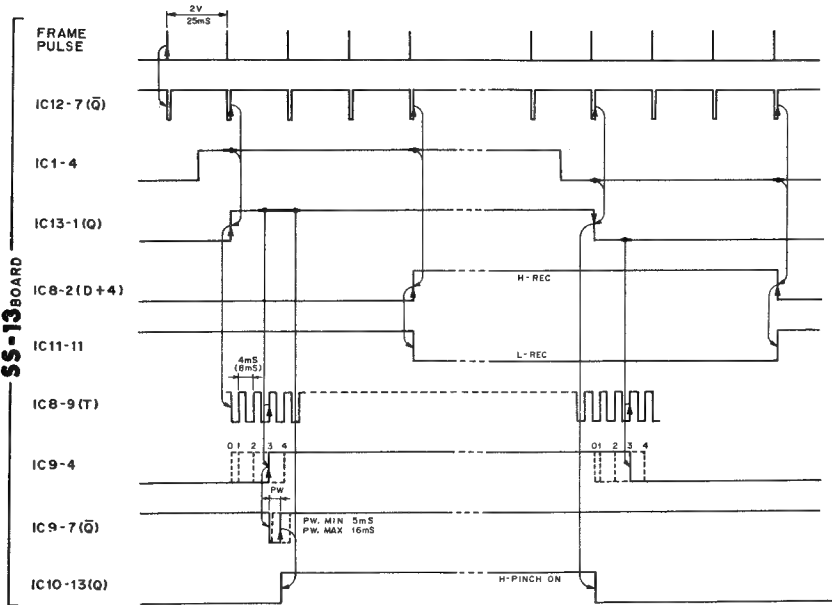
The shaded and -marked components are critical to safety.

Replace only with same component as specified.

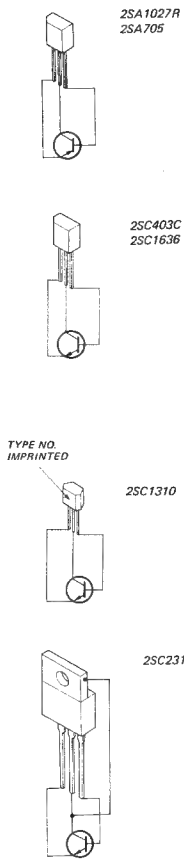
FRAME PULSE TIMING CHART (SS-10 BOARD)



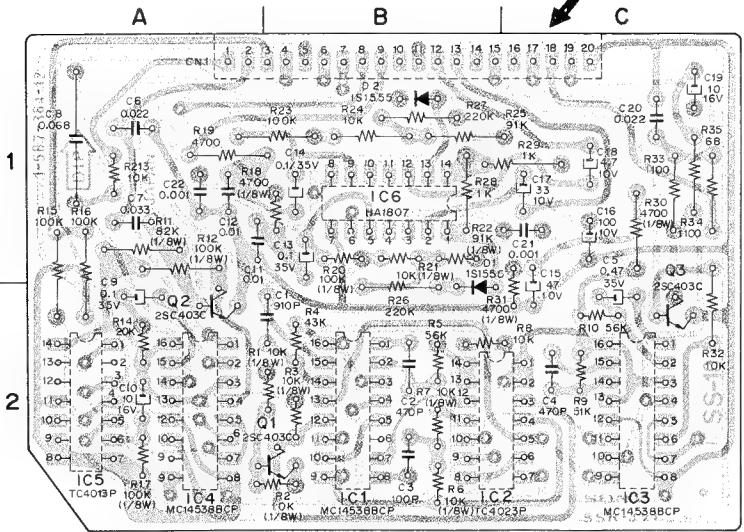
REC SIGNAL/PINCH-ON TIMING CHART (SS-13 BOARD)



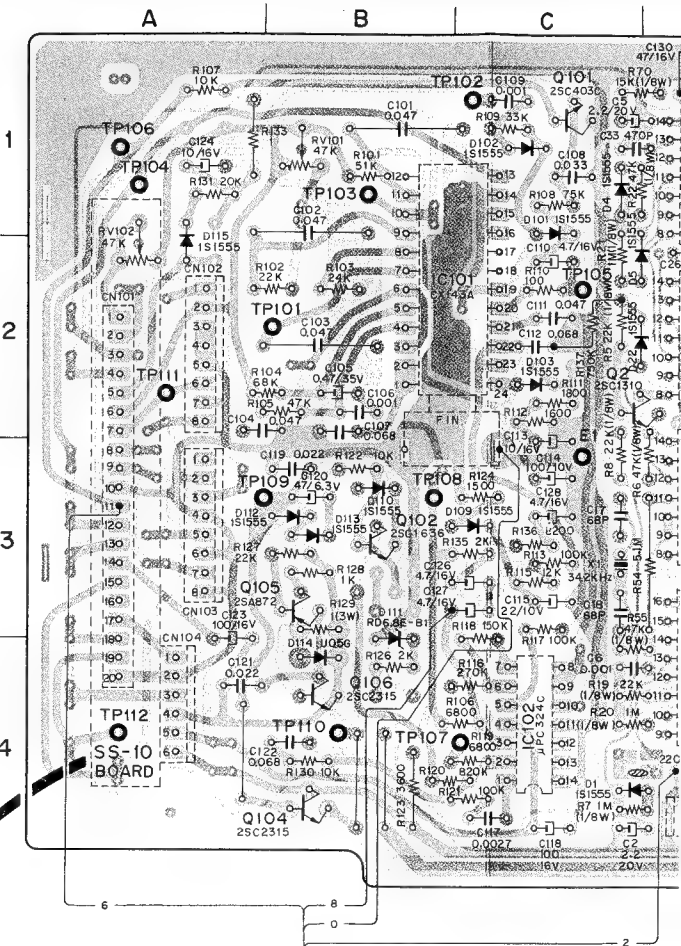
SS-13 (SYSTEM CONTROL)
SS-10 (FRAME PULSE GENERATOR)
GH-4 (PICTURE SPLITTING COMPENSATOR)



CN1	I - 3	D31	E - 4	IC14	F - 1
CN2	I - 2	D32	E - 4	IC15	F - 4
CN101	A - 2	D33	E - 4	IC16	D - 4
CN102	A - 2	D34	D - 4	IC17	H - 1
CN103	A - 3	D36	H - 2	IC18	I - 1
CN104	A - 4	D37	H - 2	IC101	B - 2
CN105	H - 4	D38	H - 2	IC102	C - 4
D1	C - 4	D40	F - 2	Q1	G - 2
D2	D - 2	D41	G - 3	Q2	C - 2
D3	D - 1	D101	C - 1	Q4	F - 3
D4	C - 1	D102	C - 1	Q5	G - 2
D5	D - 2	D103	C - 2	Q6	G - 2
D6	H - 2	D109	C - 3	Q101	C - 1
D7	G - 1	D110	B - 3	Q102	B - 3
D8	D - 3	D111	B - 3	Q104	B - 4
D9	F - 1	D112	B - 3	Q105	B - 3
D10	F - 1	D113	B - 3	Q106	B - 4
D11	F - 1	D114	B - 4	RV1	E - 2
D12	F - 1	D115	A - 2	RV101B	- 1
D13	F - 1	E1	C - 3	RV102A	- 2
D14	F - 1	E2	I - 2	TP1	H - 2
D15	F - 1	IC1	D - 1	TP2	I - 2
D16	F - 1	IC2	D - 2	TP3	D - 3
D17	F - 1	IC3	D - 3	TP101	B - 2
D18	F - 1	IC4	D - 4	TP102	C - 1
D19	F - 2	IC5	D - 1	TP103	B - 1
D21	E - 3	IC6	D - 2	TP104	A - 1
D22	D - 2	IC7	D - 3	TP105	C - 2
D23	F - 4	IC8	D - 4	TP106	A - 1
D24	G - 4	IC9	E - 3	TP107	C - 4
D25	I - 3	IC10	F - 3	TP108	B - 3
D26	F - 1	IC11	F - 3	TP109	B - 3
D27	F - 1	IC12	G - 2	TP110	B - 4
D28	E - 4	IC13	G - 1	TP111	A - 2
D29	E - 4			TP112	A - 4
D30	E - 4				

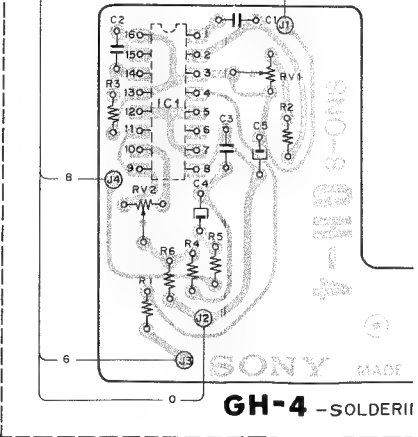


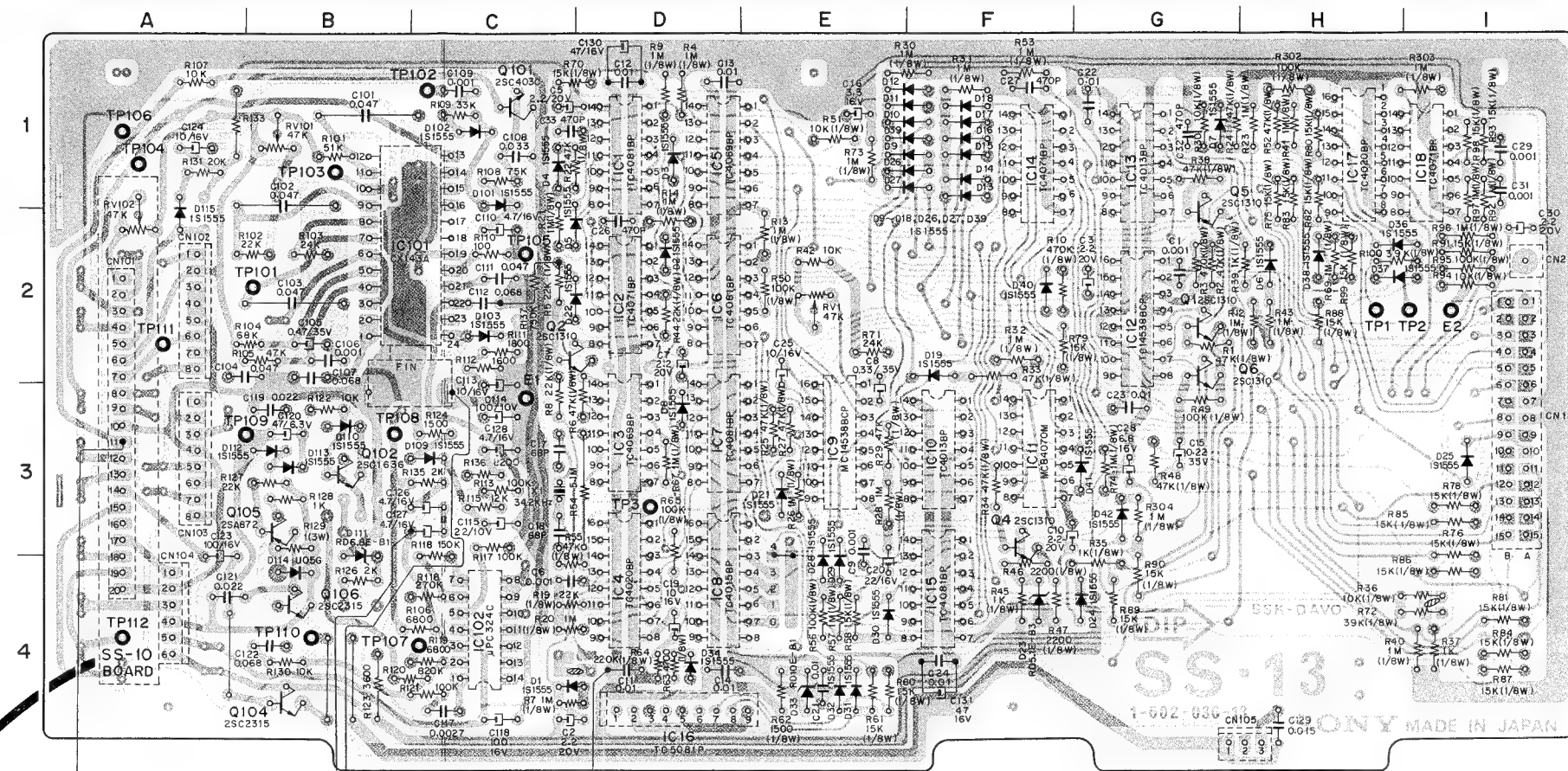
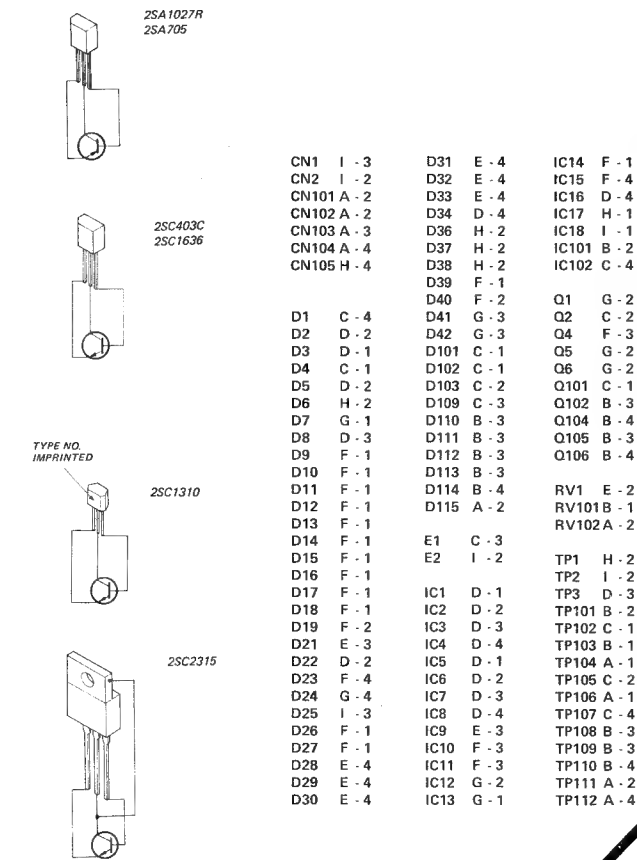
SS-10 - SOLDERING SIDE -



CN1	B - 1
D1	B - 2
D2	B - 1
IC1	B - 2
IC2	B - 2
IC3	C - 2
IC4	A - 2
IC5	A - 2
IC6	B - 1
Q1	B - 2
Q2	A - 2
Q3	C - 2

SERIAL NO. 10546 AND HIGHER (PAL)
SERIAL NO. 10086 AND HIGHER (SECAM)



[illegible]

CN1	B - 1
D1	B - 2
D2	B - 1
IC1	B - 2
IC2	B - 2
IC3	C - 2
IC4	A - 2
IC5	A - 2
IC6	B - 1
Q1	B - 2
Q2	A - 2
Q3	C - 2

SERIAL NO. 10546 AND HIGHER (PAL)
SERIAL NO. 10086 AND HIGHER (SECAM)

2

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SONY

MADE IN JAPAN

GH-4 - SOLDERING SIDE-

FP-8

AR-8

CN-15

EA-1

SM-19(PAL)
SM-20(SECAM)

HEAD DRUM
H3
PP150-5803

SW-15

CN-16

CP-23

SW-25

SS-10

SS-13

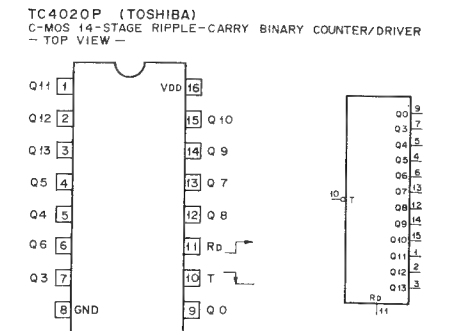
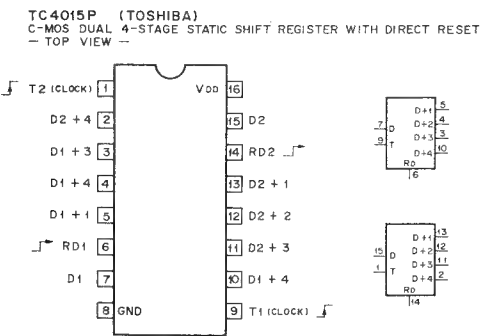
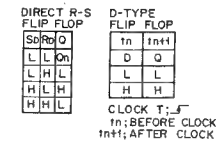
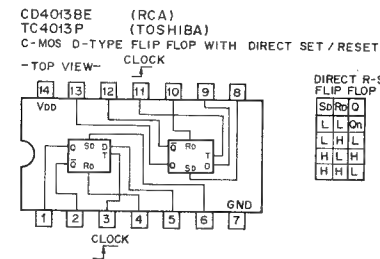
M2
DRUM MOTOR

SS-13 (SYSTEM CONTROL) SS-10 (FRAME PULSE GENERATOR)

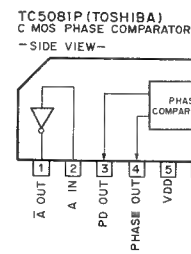
NOTE #1: R137 750K ADDED
S/N. 10476 ~ (PAL)
S/N. 10056 ~ (SECAM)

#2 C17
C18 100P → 68P
R55 47K → 470K
S/N. 10926 ~ (PAL)
S/N. 10126 ~ (SECAM)

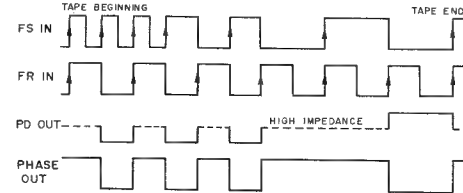
#3 C130
C131 47/16V ADDED
S/N. 10926 ~ (PAL)
S/N. 10126 ~ (SECAM)



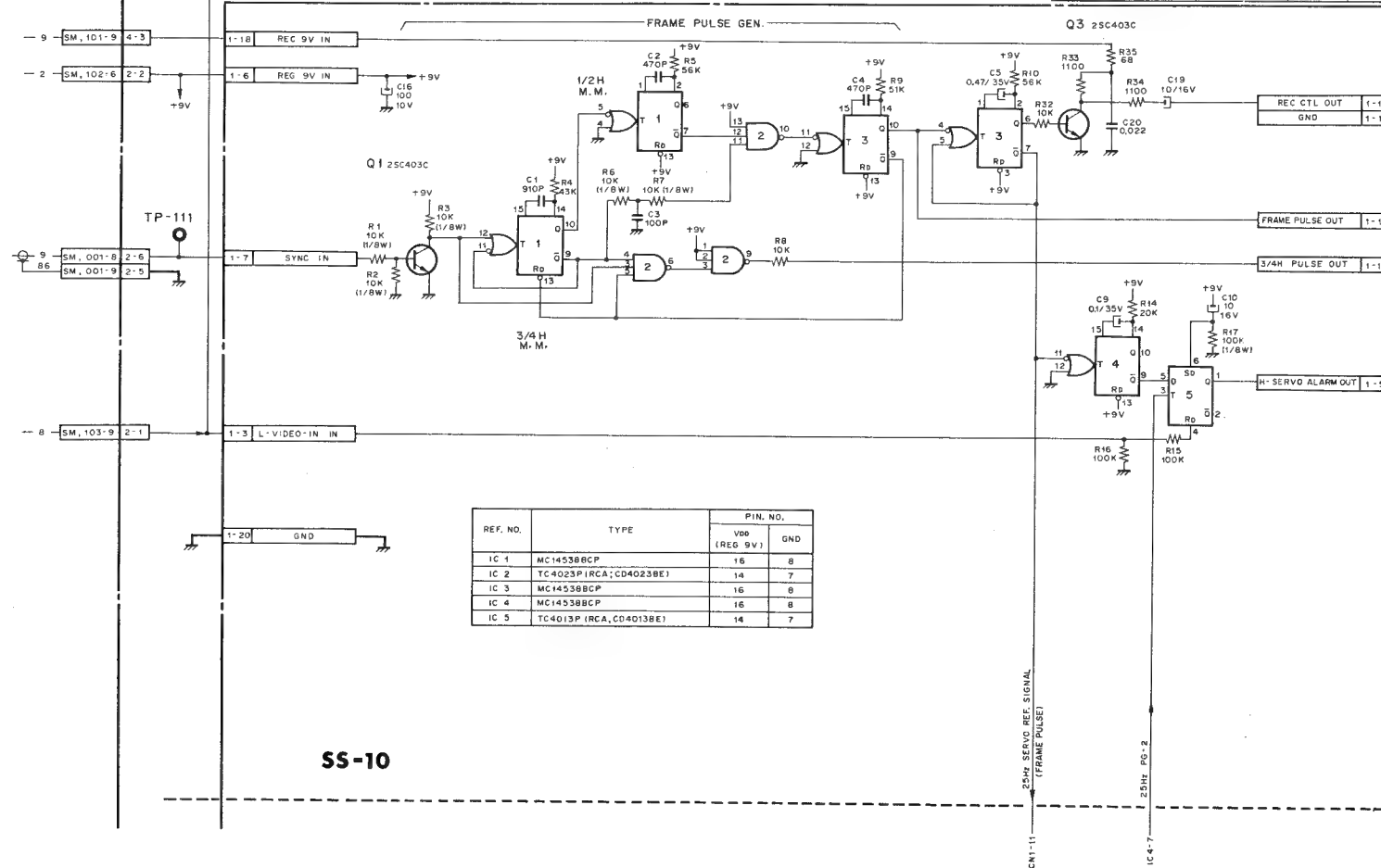
SS-13



PHASE COMPARATOR TIMING CHART



REF. NO.	TYPE	PIN. NO.
IC 1	TC4081P (RCA; CD4081BE)	14 7
IC 2	TC4071P (RCA; CD4071BE)	14 7
IC 3	TC4069P (RCA; CD4069BE)	14 7
IC 4	TC4020P	16 8
IC 5	TC4069P (RCA; CD4069BE)	14 7
IC 6	TC4081P (RCA; CD4081BE)	14 7
IC 7	TC4081P (RCA; CD4081BE)	14 7
IC 8	TC4015P	16 8
IC 9	MC14538BCP	16 8
IC 10	TC4013P (RCA; CD4013BE)	14 7
IC 11	TC4030P (RCA; CD4030BE)	14 7
IC 12	MC14538BCP	16 8
IC 13	TC4013P (RCA; CD4013BE)	14 7
IC 14	TC4071P (RCA; CD4071BE)	14 7
IC 15	TC4081P (RCA; CD4081BE)	14 7
IC 16	TC5081P	5 (9V) 9
IC 17	TC4020P	16 8
IC 18	TC4071P (SS-16 BOARD)	14 7



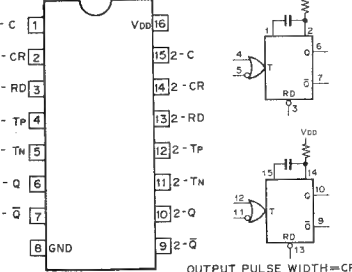
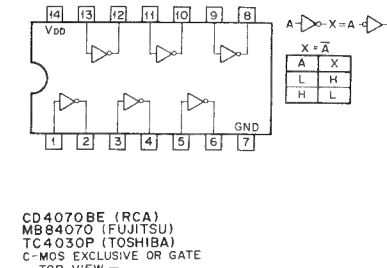
SS-10

REF. NO.	TYPE	PIN. NO.
IC 1	MC14538BCP	16 8
IC 2	TC4023P (RCA; CD4023BE)	14 7
IC 3	MC14538BCP	16 8
IC 4	MC14538BCP	16 8
IC 5	TC4013P (RCA; CD4013BE)	14 7

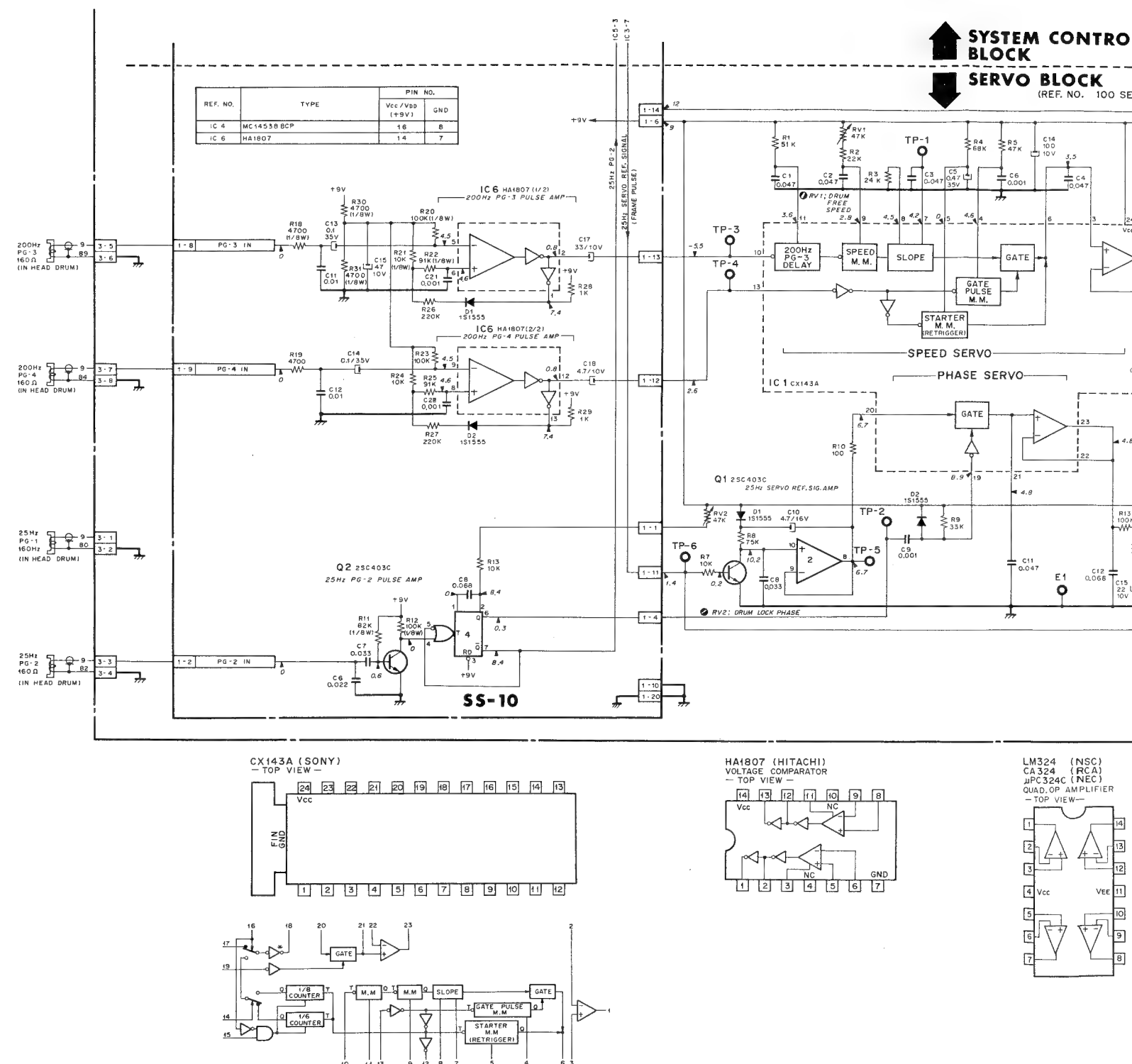
CN-16

SYSTEM CON
BLOCK
SERVO BLOC
(REF. NO.)

CD4069BE(RCA)
TC4069P (TOSHIBA)
C-MOS INVERTER

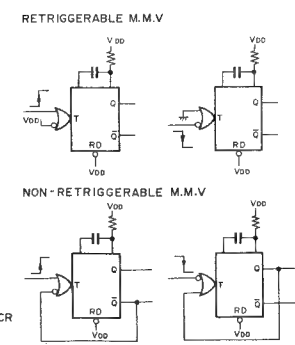
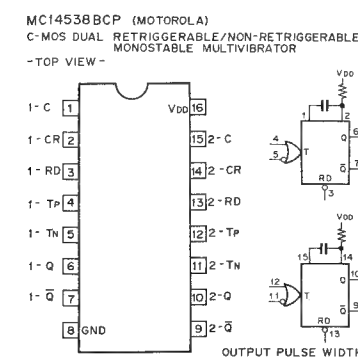
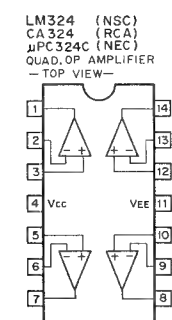
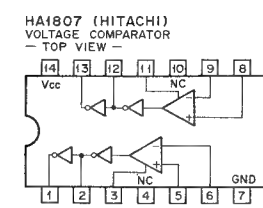
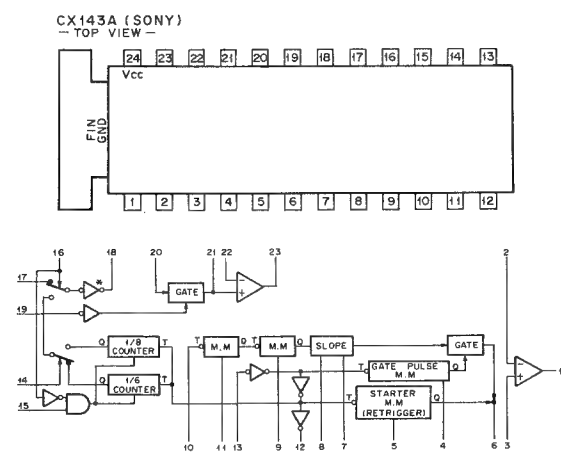
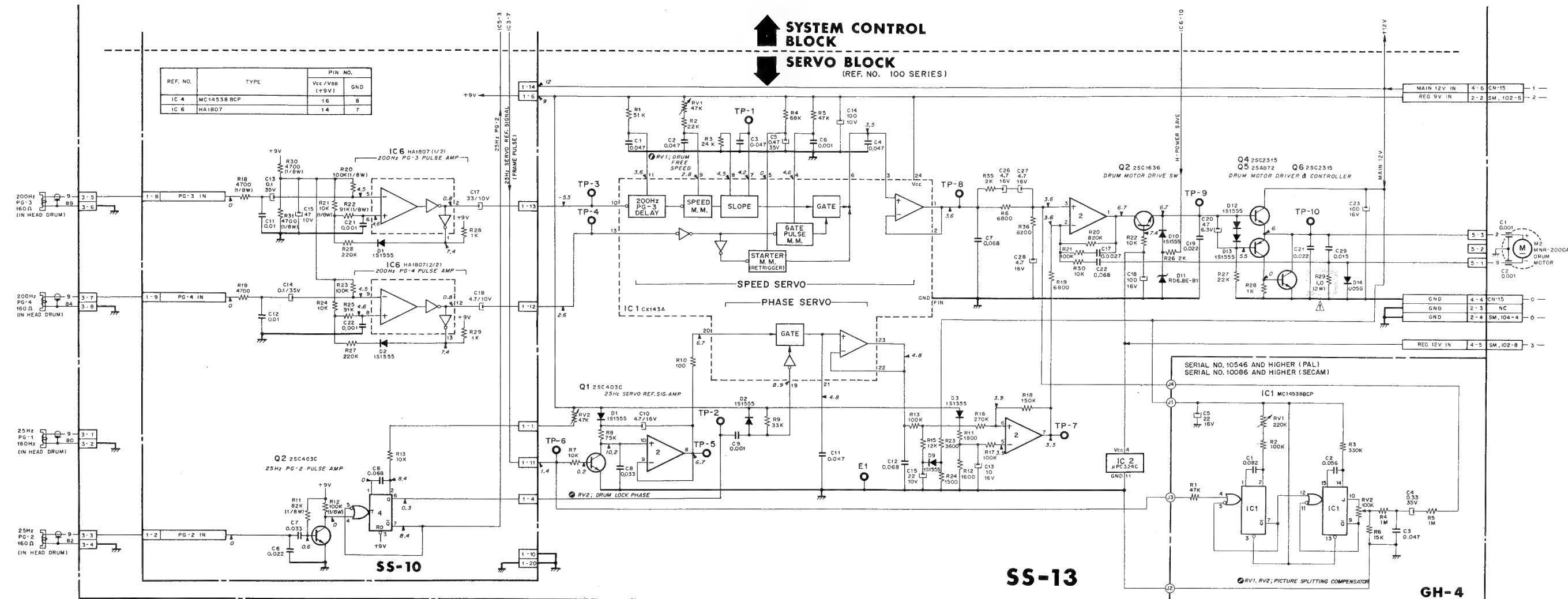



SS-13 (SERVO)
SS-10 (PG AMP)
GH-4 (PICTURE SPLITTING COMPENSATOR)



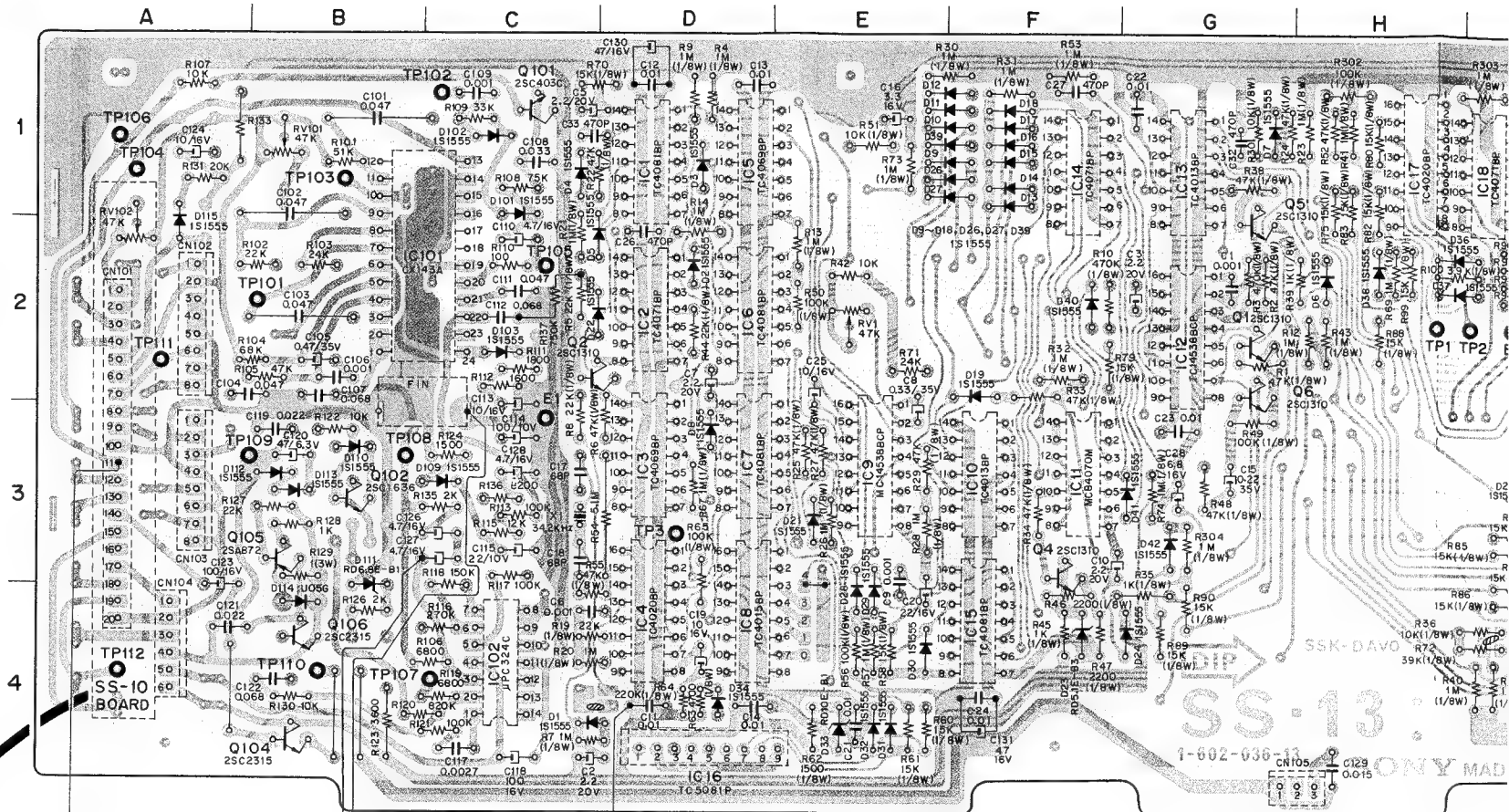
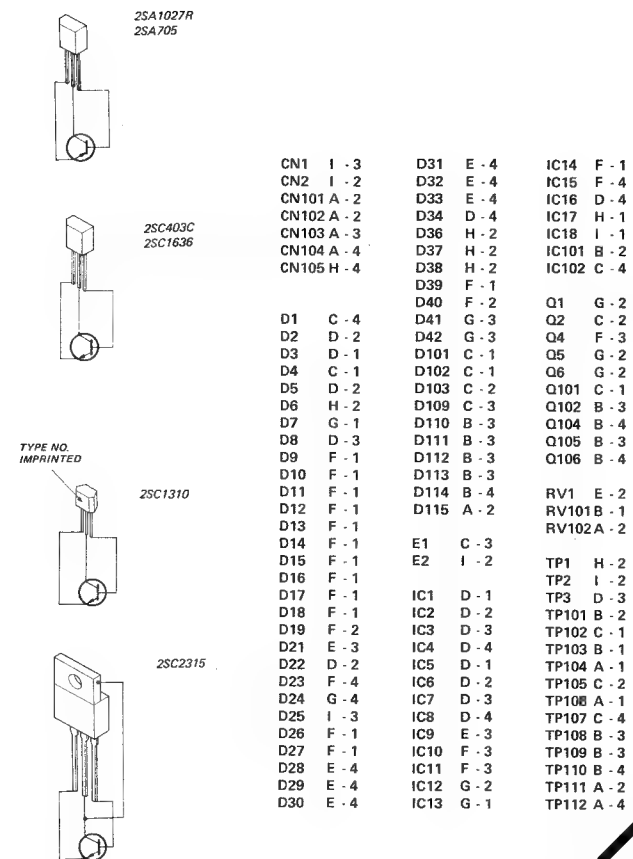
3-45

SS-13 (SERVO)
SS-10 (PG AMP)
GH-4 (PICTURE SPLITTING COMPENSATOR)

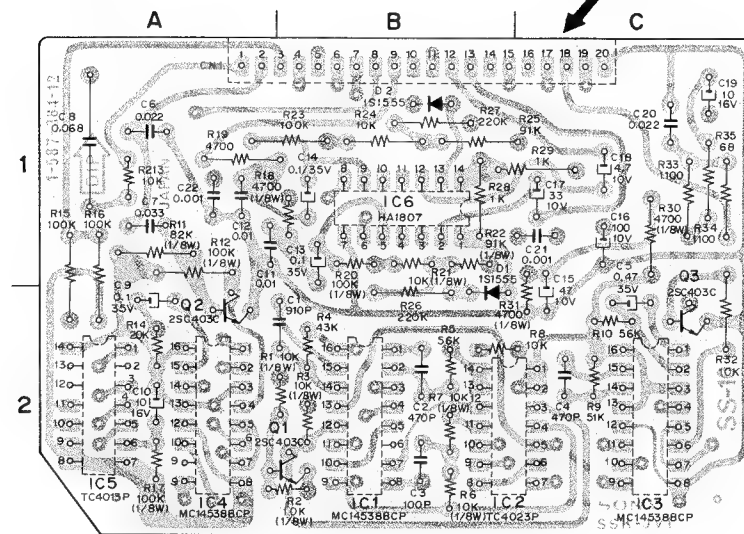


The shaded and -marked components are critical to safety.
Replace only with same component as specified.

SS-13 (SERVO)
SS-10 (PG AMP)
GH-4 (PICTURE SPLITTING COMPENSATOR)



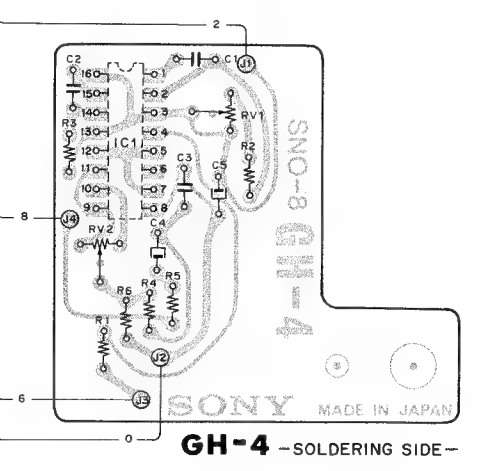
SS-13 — SOLDERING SIDE



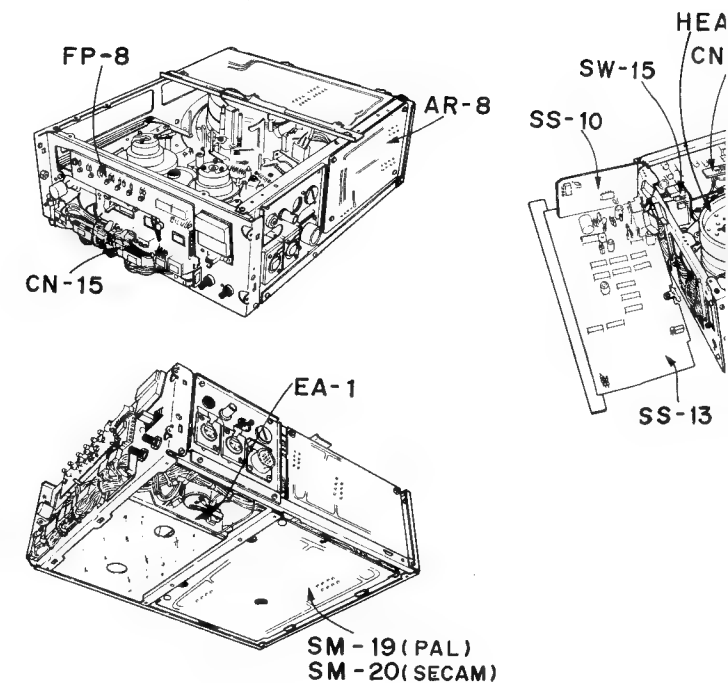
SS-10 — SOLDERING SIDE —

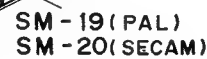
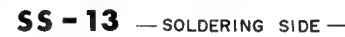
CN1 B - 1
D1 B - 2
D2 B - 1
IC1 B - 2
IC2 B - 2
IC3 A - 2
IC4 A - 2
IC5 A - 2
IC6 B - 1
Q1 B - 2
Q2 A - 2
Q3 C - 2

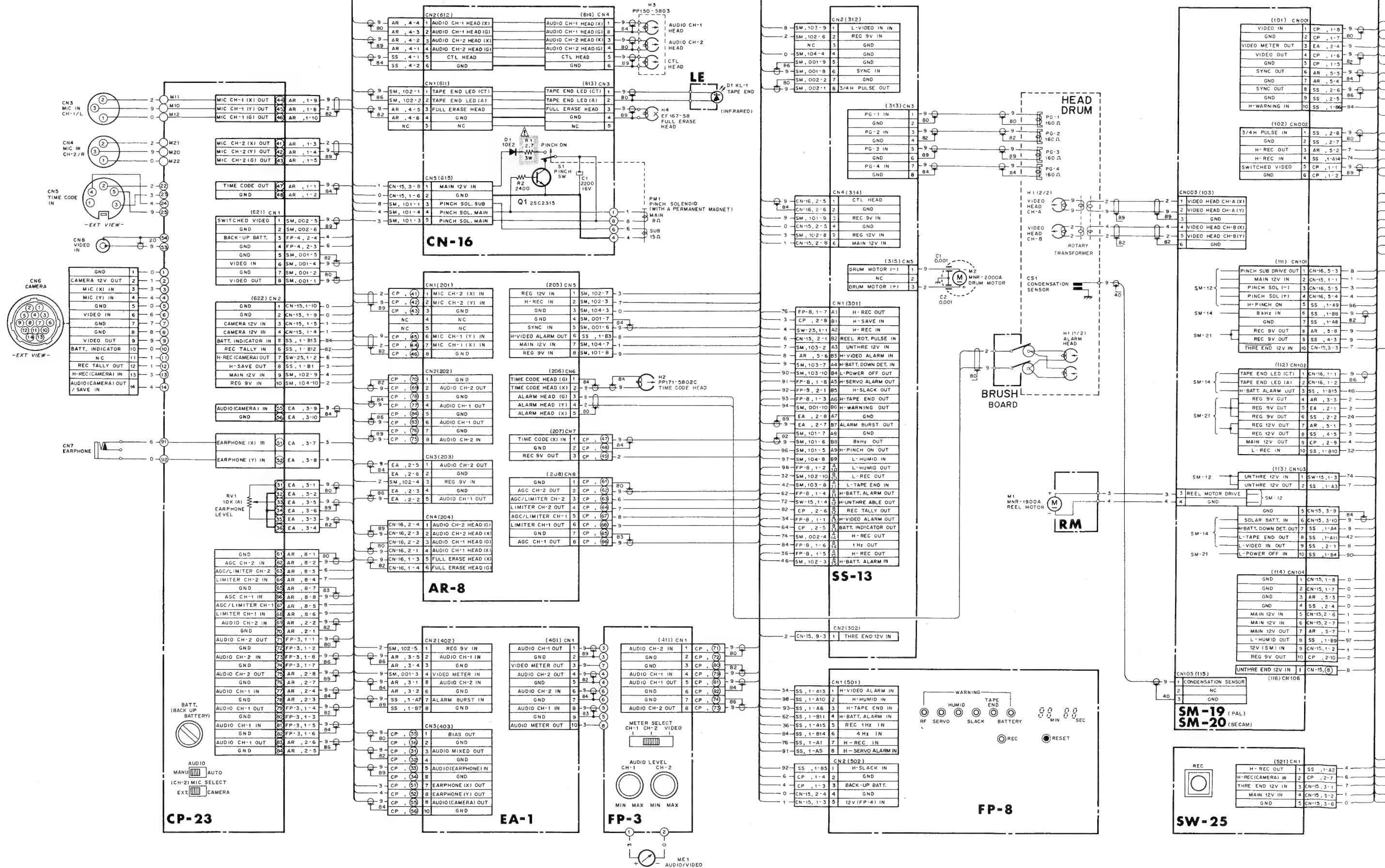
SERIAL NO. 10546 AND HIGHER (PAL)
SERIAL NO. 10086 AND HIGHER (SECAM)

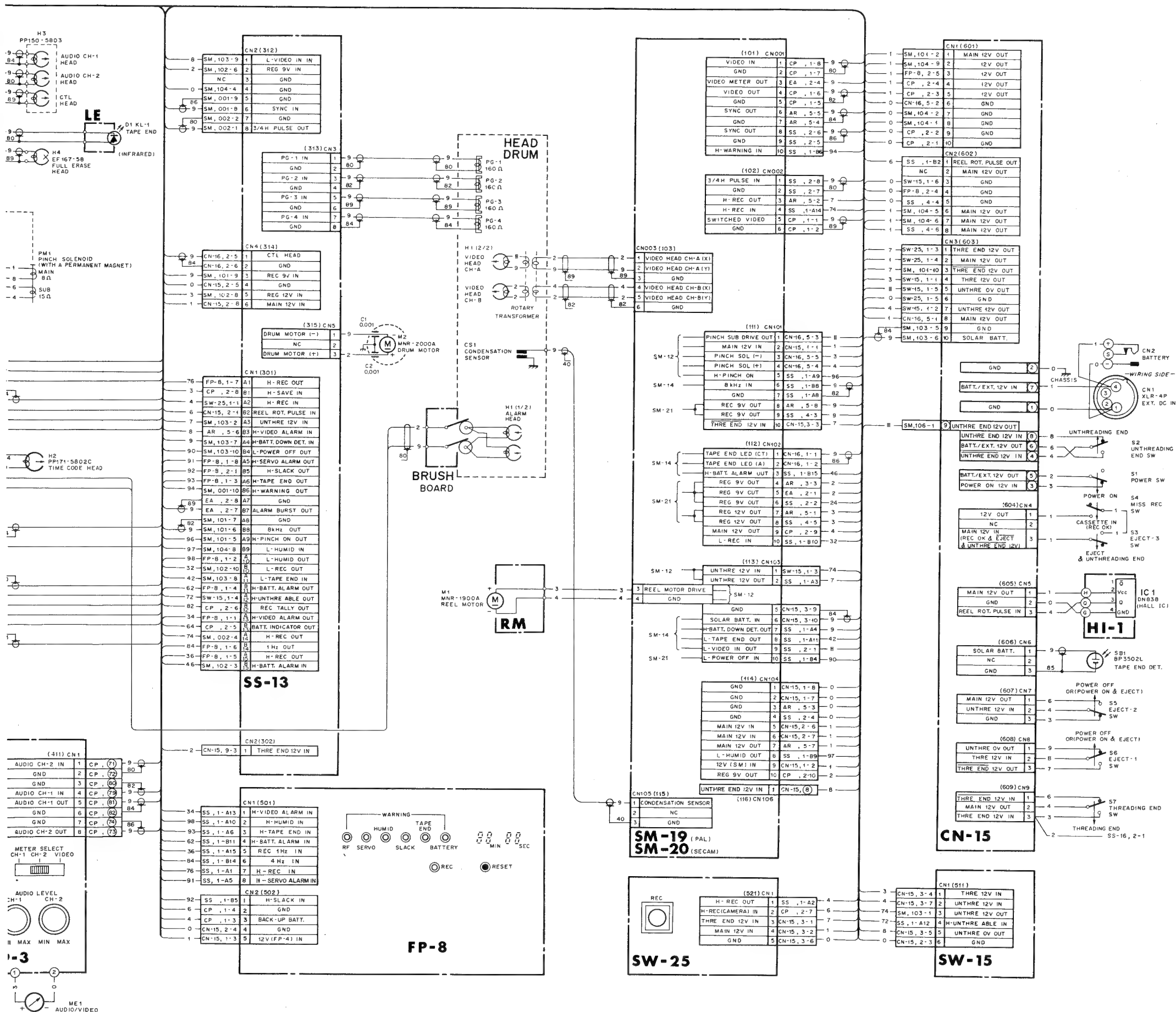



GH-4 — SOLDERING SIDE —





FRAME WIRING
RM (REEL MOTOR BOARD)



The shaded and -marked components are critical to safety.
Replace only with same components as specified.

SECTION 4

PERIODIC CHECK AND MAINTENANCE

It is recommended to perform the maintenance and the periodic check mentioned below for the best operation of the function and performance of the machine and for prolonging the lives of the machine and the tape.

4-1. CHECK PROCEDURE AFTER COMPLETION OF MACHINE REPAIR WORK

Perform the following maintenance after the repair without regarding the operating hours of the machine.

- (1) Cleaning of Video Heads
 - Press chamois moistured with the cleaning fluid and turn the drum slowly with the hand, cleaning the heads. (Never turn the motor by the electric power for the cleaning.)
 - Never move the chamois in the vertical direction of the head tip in the cleaning. It tends to damage the head tips.
- (2) Cleaning of tape running system
 - Wipe the tape bearing surfaces (of the tape guide, drum, capstan, and pinch roller) with a piece of chamois saturated with the cleaning fluid.

4-2. PERIODIC CHECK AND MAINTENANCE

Perform the maintenance checks described separately in accordance with the operational hours of the machine.

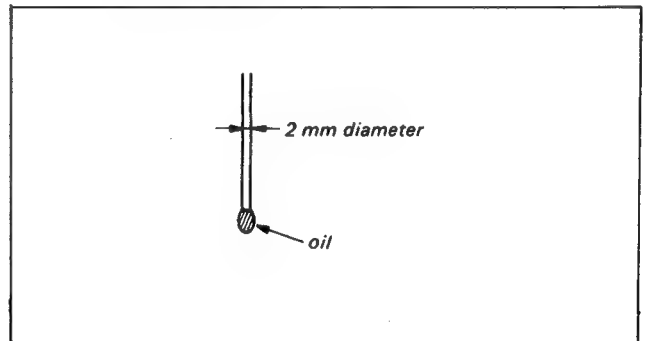
4-3. OTHERS

SONY oil

- Be sure to use the SONY oil as the lubrication oil. (If oil other than the SONY oil is used, various troubles due to a different viscosity tends to be caused.)

SONY oil: Part No. 7-661-018-01

- Use the SONY oil in which dust or other foreign material have not mixed for lubricating the bearing. (If foreign material is in the oil, wear or burning of the bearing tends to be caused.)
- A drop of the lubrication oil in the following description is equal to an oil drop on a pick with 2mm diameter as shown in the figure.



○; cleaning ○; lubrication ★; replacement ◇; check

OPERATING HOURS (H)		500	1000	1500	2000	2500	3000	3500	4000	4500	5000	REMARKS
ITEM	REPLACEMENT PARTS No.											
Tape path cleaning	_____	○	○	○	○	○	○	○	○	○	○	Perform whenever repair work is attempted.
Audio/CTL head cleaning	_____											
Video heads cleaning and replace	A-6709-302-A	○	★	○	★	○	★	○	★	○	★	Life of video heads are effected extensively by operating ambient condition.
Pinch roller cleaning and replace	X-3657-003-0	○	○	○	○	○	★	○	○	○	○	Cleaning the belt, idler and tire with a piece of cloth saturated with the cleaning fluid.
Idler cleaning and replace	X-3657-015-0	—	○	—	○	—	○	—	★	—	○	
RM belt cleaning and replace	3-657-035-00											
Idler belt cleaning and replace	3-657-036-00											
Capstan belt cleaning and replace	3-657-004-00	—	○	—	★	—	○	—	★	—	○	
Drum belt cleaning and replace	3-657-003-00											
S idler tire cleaning and replace	3-657-037-00	—	○	—	○	—	○	—	★	—	○	
Eccentric roller tire cleaning and replace	3-657-158-00	○	★	○	★	○	★	○	★	○	★	
Brake band replace	X-3645-027-0	—	—	—	—	—	★	—	—	—	—	
T brake shoe replace	X-3657-027-0											
Measurement of FWD back tension	_____	—	◇	—	◇	—	◇	—	◇	—	◇	Measure according to sec. 7-2.

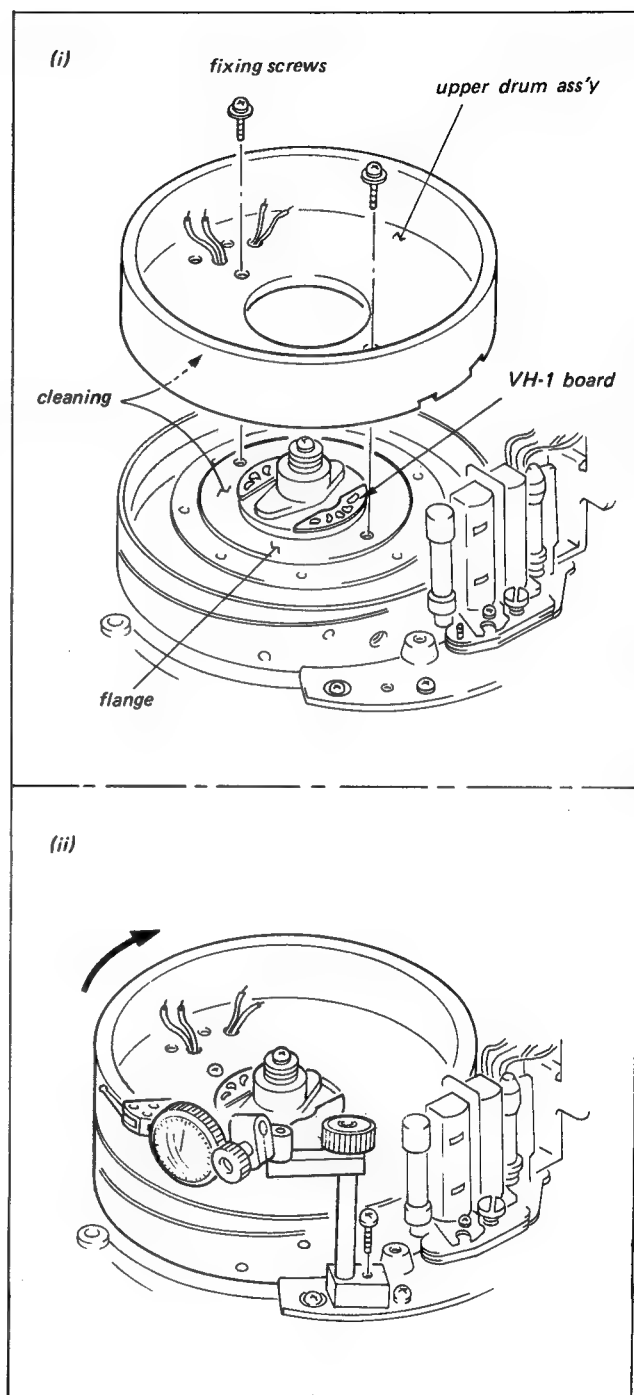
SECTION 5

REPLACEMENT OF MAJOR PARTS

5-1. REPLACEMENT OF UPPER DRUM AND ECCENTRICITY ADJUSTMENT

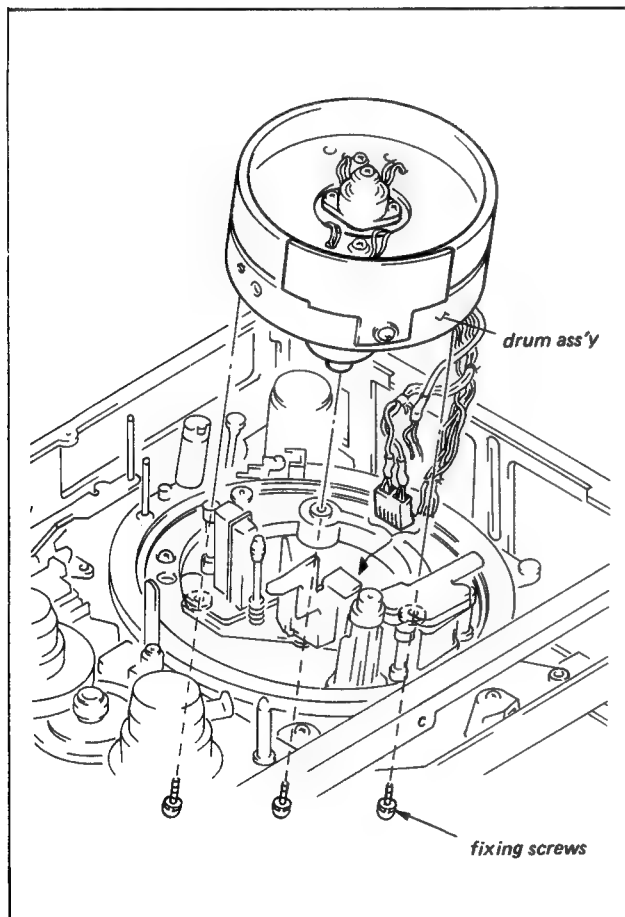
The video head cannot be replaced as a single part. When the head is required to be replaced, whole upper drum assembly must be replaced.

1. Remove the brush assembly.
2. Disconnect the eight leads to the VH-1 printed circuit board from the video and the alarm heads. Remove the upper drum assembly.
3. Clean the flange (the surface on which the upper drum is placed) and the bottom surface of the replacement upper drum assembly with a cloth dampened with a cleaning fluid.
4. Place the upper drum assembly so that the head of the white leads is close to the round indentation on the surface of the flange. (The round indentation can be seen through the hole in the end of the printed circuit board the white leads are connected to). Thread the two screws snugly but do not tighten.
5. Assemble the drum eccentricity adjustment jigs (1), (2), (3) and (4) as shown in figure. Mount the assembled jigs on the machine so that the tip probe positions at the point about 5 mm apart from the top edge of the upper drum.
6. Turn the upper drum slowly clockwise (↻) (never turn it counterclockwise, see Fig. 2-2-1.) and confirm the pointer deflection of the gauge is within 5μ during one complete turn of the upper drum. If the specification is satisfied proceed with step 9. If it is not, perform step 7.
7. Tap the inside of the upper drum with a nylon hammer or a screwdriver handle and like so that the gauge deflection remains within 5μ .
8. After the adjustment, tighten the two screws that are securing the upper drum, alternately and gradually using a tightening torque: more than 10kg. cm.
9. After the screws are tightened, check again that the eccentricity of the upper drum is within 5μ .
10. Solder the leads from the video and the alarm heads to the VH-1 printed circuit boards.
11. Insert, thread and run cleaning cassette tape KCS-1C in the normal REC mode for 10 to 20 seconds if the tape is being used for the first time. This will smooth out the surface of the video heads.
12. Perform the adjustments, according to the adjustment item table after a part replacement in sec. 5-6.



5-2. REPLACEMENT OF DRUM ASSEMBLY

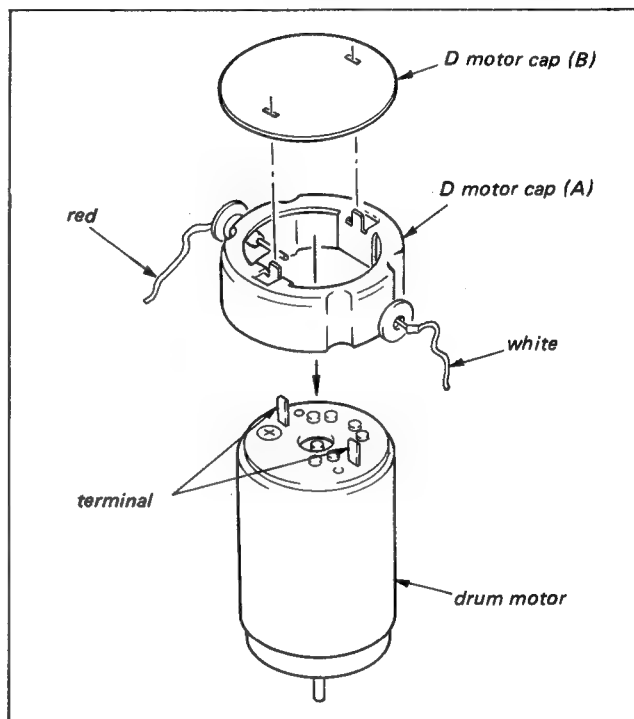
1. Disconnect the 8 pin connector (CN3003) located on the SS-9 board and 6 pin connector (CN1003), 3 pin connector (CN1105) located on the SM-10 board.
2. Cut the harness holders that are holding these harness.
3. Remove the three fixing screws and remove the defective drum.
4. Remove the drum guard and the drum pulley from the defective drum and install them on the new unit.
5. Place the new drum unit on the drum base. Install the drum on the base while turning the drum unit in a clockwise direction as seen from top of the set. (Turning the drum clockwise increases the head-to-tape contact at the drum's input and also the overlap.)
6. Re-connect the connectors and re-install the belt.
7. Clamp the harness so that the harness must not touch the belt and the pulley.



5-3. REPLACEMENT OF DRUM MOTOR

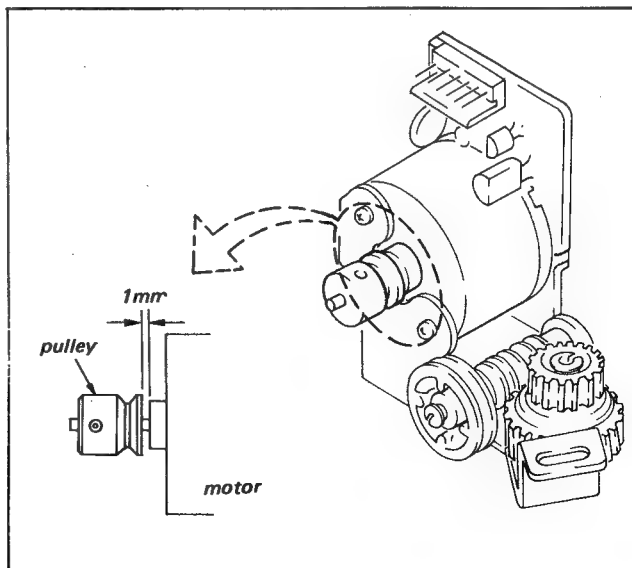
1. Remove the motor pulley (D) from the rear side of the machine, by loosening the two 2.6 mm dia setscrews (with edge length 1.27 mm Allen wrench).
2. Remove the drum motor from the machine.

3. Lift up the two claws of the D motor cap (A) and remove the D motor cap (B).
4. Unsolder the two capacitors connected to the motor terminals.
5. Mount a new motor by reversing the steps (1) through (4). Note that the motor pulley (D) should be installed while it is being pushed toward the motor.



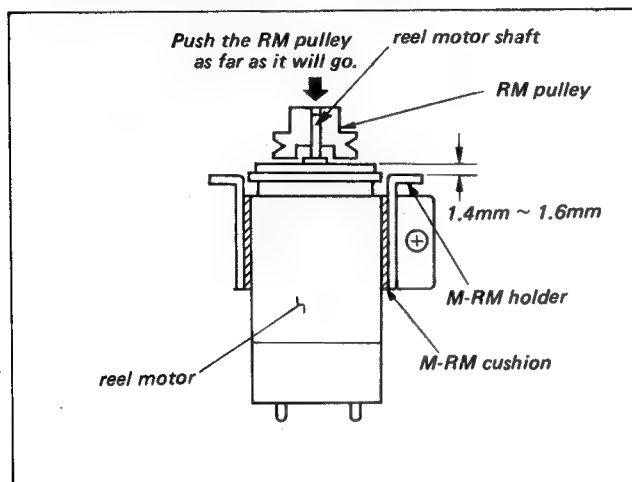
5-4. REPLACEMENT OF THREADING MOTOR

1. Remove the threading gear assembly and replace the threading motor with a new one.
2. Install the LM pulley (2) so that the clearance between the pulley and the motor is 1 mm.



5-5. REPLACEMENT OF REEL MOTOR

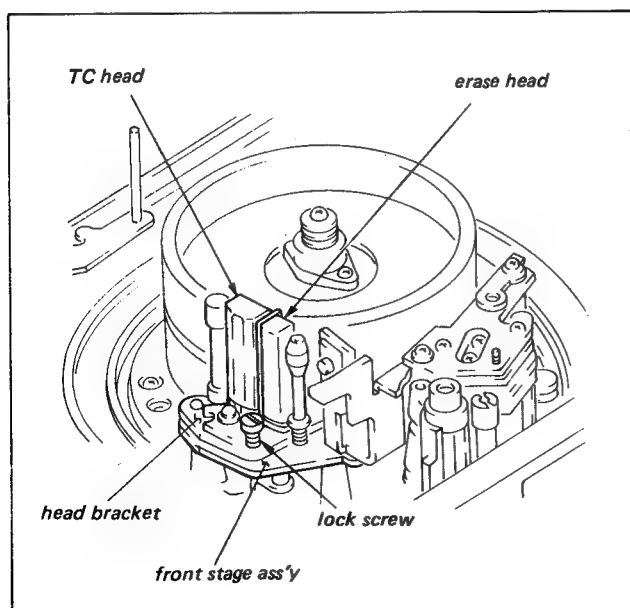
1. Remove the reel motor and replace it with a new one.
2. Install the M-RM cushion, M-RM holder, and RM pulley on the reel motor as shown in the figure below.



5-6. REPLACEMENT OF TC HEAD/FULL ERASE HEAD

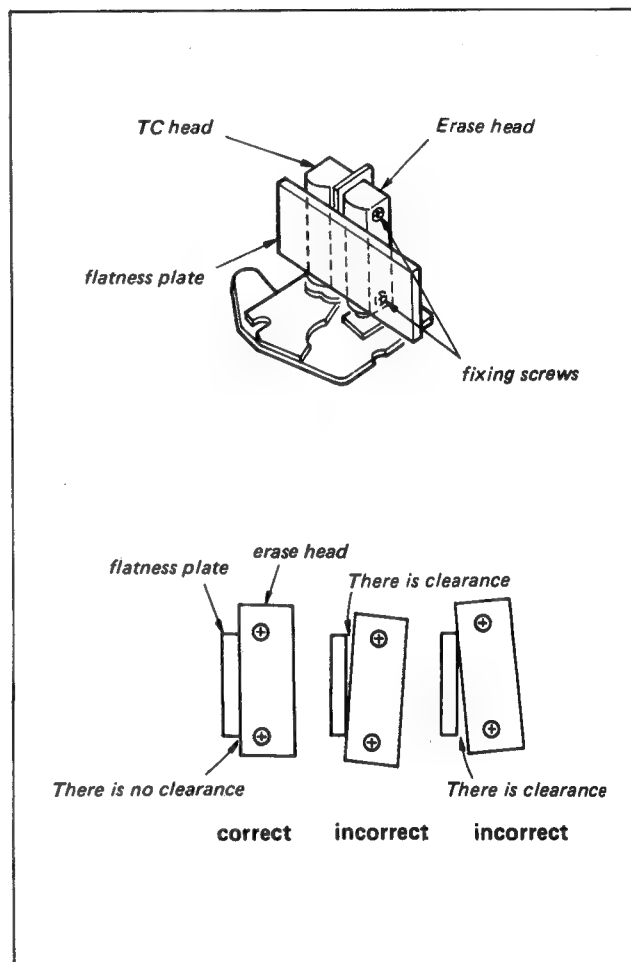
Various adjustments are required after the TC head and the full erase head replacement. The adjustments for the head block only are described here in this section. As regard to the adjustments to be performed during the actual tape running, please refer to sec. 8.

1. Remove the lock screw and the head bracket.
2. Take notes of the colors of lead wires before unsoldering/removing the lead wires. Remove the lead wires.
3. Remove the cassette lid opener from the front stage assembly and remove then the front stage once from the machine (for the erase head slantness adjustment).
4. Replace the TC head or erase head. And adjust as follows.



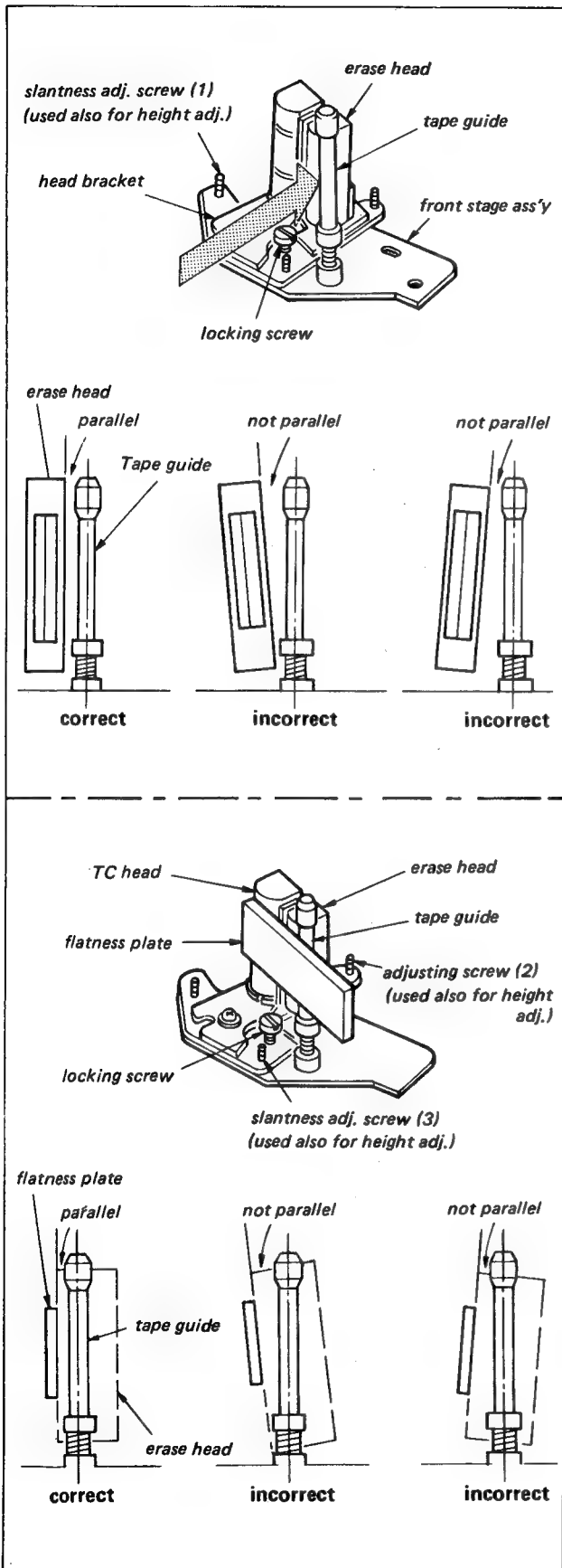
5-6-1. Erase Head Slantness Adjustment (Referring to TC Head)

1. Check to see that the clearance between the erase head and the flatness plate has no clearance, when the flatness plate is set on the erase head and TC head.
2. If the clearance is observed, loosen the two fixing screws and adjust the erase head.



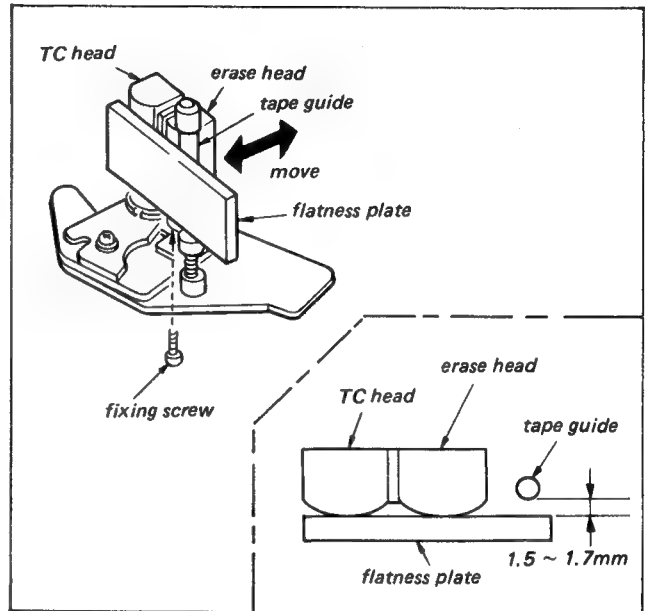
5-6-2. Erase Head Slantness/Azimuth Adjustment (Referring to Tape Guide)

1. Install the head bracket to the front stage ass'y.
2. Check to see that the erase head and tape guide are parallel, when observed in the arrow direction.
3. If not, loosen the locking screw and turn the slantness adj. screw (1) until the erase head and the tape guide are parallel.
4. Check to see that the tape guide and flatness plate are parallel, when the flatness plate is set on the erase head and TC head.
5. If not, loosen the locking screw and turn the slantness adj. screw (2) and (3) until the flatness plate and the tape guide are parallel.
6. Tighten the locking screw.



5-6-3. Erase Head Position Adjustment

1. Check to see that the clearance between the tape guide and the flatness plate is 1.5 ~ 1.7 mm, when the flatness plate is set on the erase head and TC head.
2. If not, loosen the fixing screw and adj. the erase head position.



5-7. ADJUSTMENT ITEMS AFTER REPLACEMENT OF MAJOR PARTS

Replacement Parts	Adjustment Items
[Drum system]	
• Drum Unit	Brush Mounting Position Adj. (8-11) → Tracking Adj. (8-3) → Video Head Azimuth Adj. (8-14) → Drum Lock Phase Adj. → REC Current Adj.
• Upper Drum Ass'y	Eccentricity Adj. (5-1) → Brush Mounting Position Adj. (8-11) → Tracking Adj. (8-3) → Video Head Dihedral Adj. (8-10) → Video Head Azimuth Adj. (8-14) → Drum Lock Phase Adj. → REC Current Adj.
[Threading/Unthreading system]	
• Threading DC motor	Pulley Mounting Position Adj. (5-4) → Gear Box Mounting Position Adj. (6-2-2)
• Threading Ring	Threading Ring Rotation Adj. (6-2-1) → Gear Box Mounting Position Adj. (6-2-2) → Threading-end Switch Position Adj. (6-9-3) → Tension Regulator Pin Position (1) (6-4-1) → Unthreading-end Switch Position Adj. (6-9-4) → Tape Run Adj. (1), (2) (8-1 and 8-2)
• Pinch Roller	Tape Run Adj. (1), (2) (8-1 and 8-2)
[Stationary head system]	
• TC Head	Tracking Adj. (8-3) → TC Head Head-to-Tape Contact Adj. (8-4) → TC Head Height Adj. (8-6) → Electrical Adjustment
• Erase Head	Erase Head Slantness Adj. (5-6-1) → Erase Head Slantness/Azimuth Adj. (5-6-2) → Erase Head Position Adj. (5-6-3) → Tracking Adj. (8-3) → TC Head Head-to-Tape Contact Adj. (8-4) → Electrical Adjustment
• Audio/CTL Head	Audio Head Azimuth Adj. (8-7) → Tracking Adj. (8-3) → Audio Head Height Adj. (8-6) → Audio Head Azimuth Adj. (8-7) → Audio Head Phase Adj. (8-8) → CTL Head Position Adj. (8-9) → Electrical Adjustment
[Reel Table system]	
• Reel Table	Reel Table Height Adj. (6-6-1) → Hall IC Position Adj. (6-1-2) → Brake System Adj. (7-3) → FWD Back Tension Adj. (only supply reel tale) (7-2) → Tracking Adj. (8-3)
[Back Tension system]	
• Brake Band	Tension Regulator Pin Position Adj. (2) (6-4-2) → FWD Back Tension Adj. (7-2) → Tracking Adj. (8-3)
[Brake system]	
• Brake Shoe	Brake System Adj. (7-3) → Take-up or Supply Brake Release Adj. (7-3-1 or 7-3-2) → Take-up or Supply Brake torque Adj. (7-3-3 or 7-3-4)

SECTION 6

LINK AND DRIVE SYSTEM ALIGNMENT

6-1. REEL SYSTEM ADJUSTMENT

6-1-1. Reel Table Height Adjustment

Since the reel table height from the chassis functions as the reference height for the entire tape thread and running system, it is important that the reel table height be adjusted with great care.

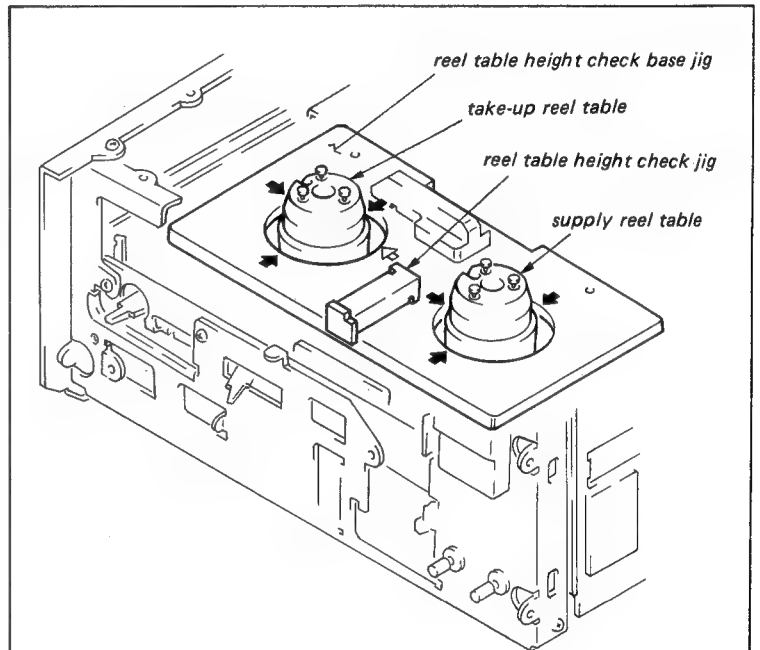
Cassette tape : _____
 Mode : EJECT mode
 Equipment : Reel Table Height Check Base Jig
 Reel Table Height Check Jig

Check procedure: The probes of the reel table height check jig marked "SO" and "TO" can slide over the reel table, leaving a space between the jig and the reel table, while the probes marked "SX" and "TX" are blocked, and cannot slide over the reel table.

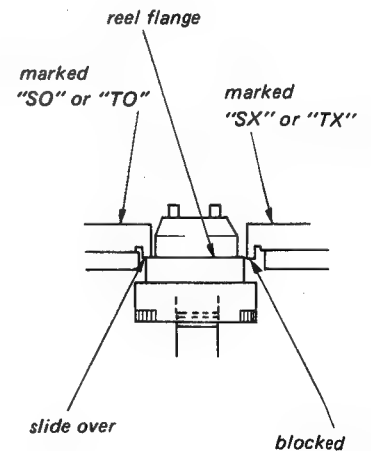
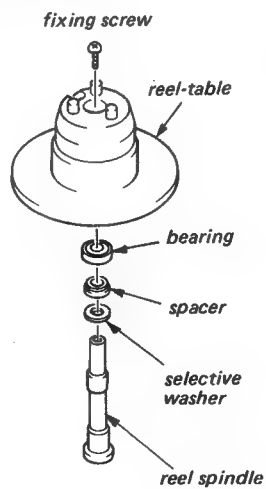
- Use the "SO" and "SX" probes for the supply reel table.
- Use the "TO" and "TX" probes for the take-up reel table.

Adjustment procedure: Adjust the height by adding to or removing washer from under the reel table.

- 6 mm diameter washer
 0.5 mm thick; 3-701-444-21
 0.25 mm thick; 3-701-444-11
 0.13 mm thick; 3-701-444-01



< Adj. procedure >



6-1-2. Hall IC Position Adjustment

A Hall IC is utilized for detecting the take-up reel table rotation in this machine. If the take-up reel table stops its rotation in the REC mode, the SLACK lamp on the front panel of the machine flashes and the REC mode is released.

Cassette tape : _____

Input signal : Ordinary video signal

Mode : REC and EJECT modes

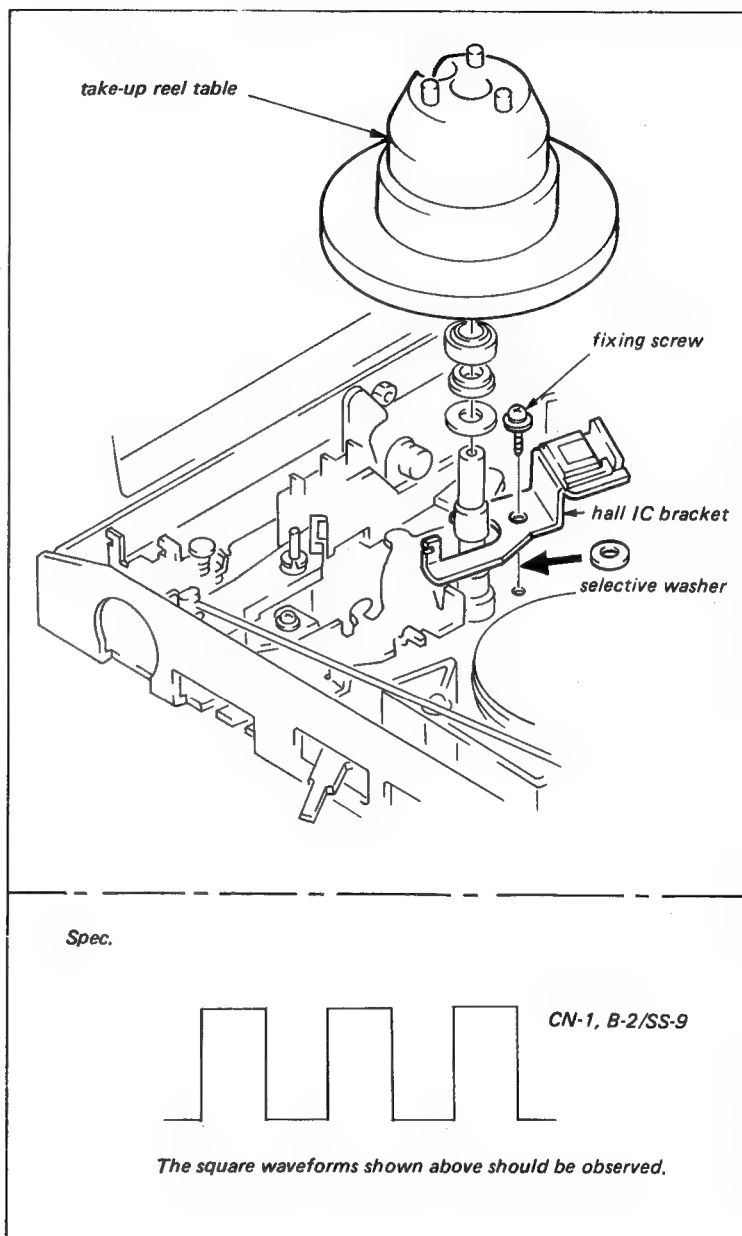
Check procedure: Check that the out put signal (CN-1, B-2/SS-9) is within the specification in the REC mode.

Adjustment procedure: Adjust the height of the hall IC bracket by adding to or removing washer from under the hall IC bracket.

- 5 mm diameter washer
0.5 mm thick; 3-701-442-21
0.25 mm thick; 3-701-442-11
0.13 mm thick; 3-701-442-01

After this adjustment, perform the following check.

- Confirm that there is no noise caused by contact of the hall IC and the take-up reel table.



6-2. THREADING/UNTHREADING SYSTEM ADJUSTMENT

6-2-1. Threading Ring Rotation Adjustment

If a correct spacing between threading ring and ring roller is not observed, possible trouble is no smooth threading or no smooth unthreading.

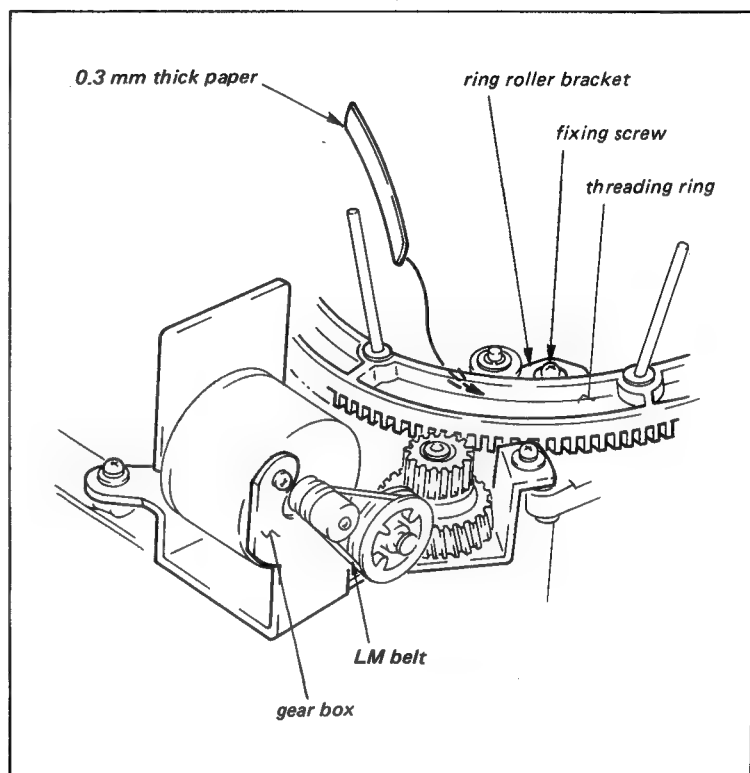
Cassette tape : _____

Mode : EJECT mode

Check procedure: Check to see that the rotation of the threading ring into the threading and unthreading modes are smooth.

And remove the LM belt. Check to see that the rotation of the threading ring is smooth by hand.

Adjustment procedure: Adjust the ring roller bracket position with insert a 0.3 mm thick paper between the threading ring and the ring roller. (Paper of this manual is 0.1 mm thick so that the three fold becomes 0.3 mm thick.)



6-2-2. Gear Box Mounting Position Adjustment

If a correct spacing between threading ring and drive gear of gear box assembly, is not observed, possible trouble is no smooth threading or no smooth unthreading.

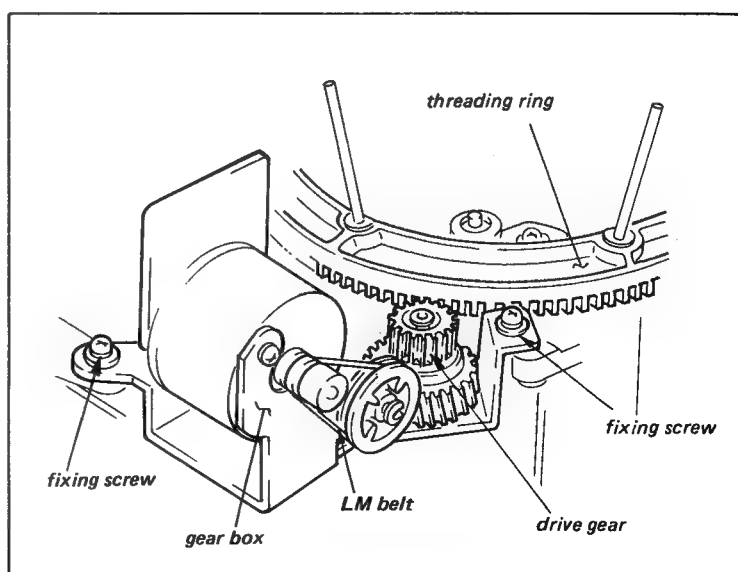
Cassette tape : _____

Mode : EJECT mode

Check procedure: Check to see that the rotation of the threading ring into the threading and unthreading modes are smooth.

And remove the LM belt. Check to see that the rotation of the threading ring is smooth by hand.

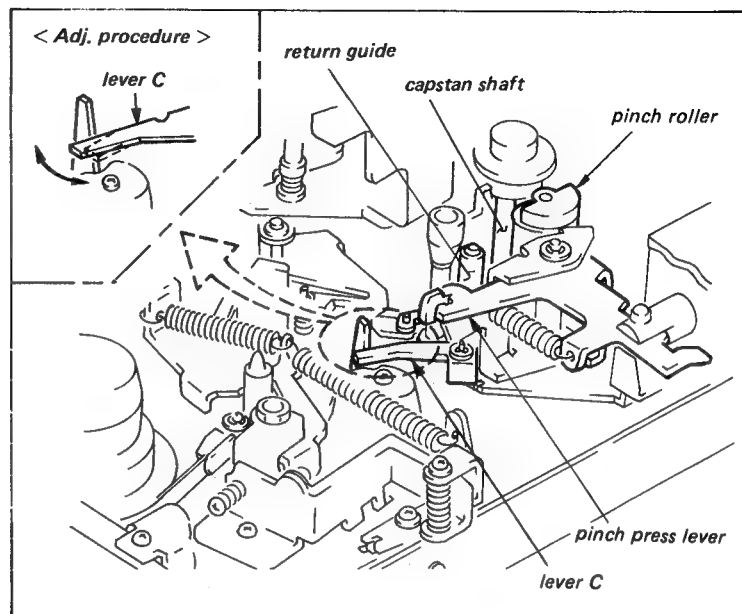
Adjustment procedure: Adjust the gear box position (While pushing the drive gear toward the threading ring, push the drive gear together with the threading ring further toward the gear box.)



6-3. LEVER C TIMING ADJUSTMENT

This is to adjust the timing of the return guide motion against the tape fed out by the capstan and the pinch roller. A poor adjustment causes picture untableness in the composite shooting.

- Cassette tape : _____
 Mode : Threading end mode
 Check procedure: (i) Push the pinch press lever lightly.
 (ii) Check that the pinch roller press the capstan shaft first, and then moves the return guide.
 Adjustment procedure: Bend the C lever in the arrow direction.



6-4. TENSION REGULATOR PIN POSITION ADJUSTMENT

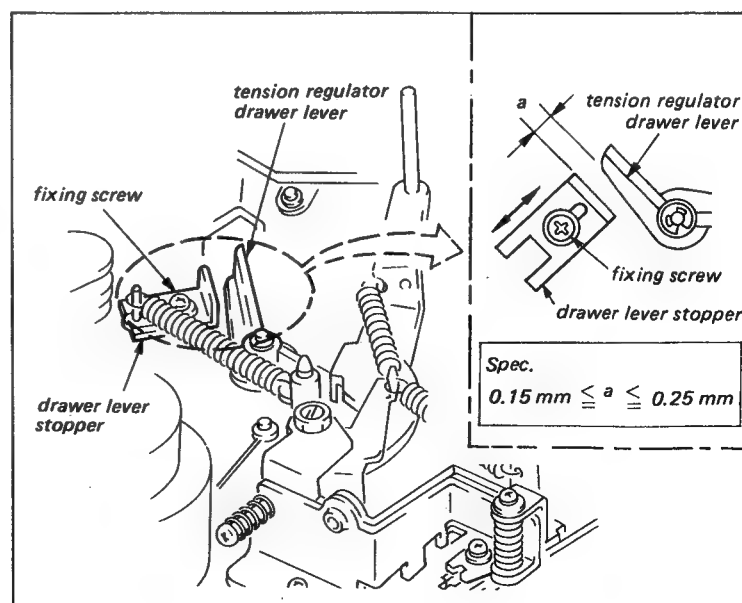
This adjustment determines the operating range of the tension regulator pin. Operating range of this pin in the rear end (drum side) as viewed from cassette, is limited by the drawer lever stopper. Operating range of this pin in the front end (cassette side) as viewed from cassette, is limited by the brake band bracket. The tension regulator pin operate in the REC mode in this range.

6-4-1. Tension Regulator Pin Position Adjustment (1)

This adjustment determines the limit of the pin operation in the rear end (drum side) as viewed from cassette.

- Cassette tape : _____
 Mode : Threading end mode
 Check procedure: Put the machine into the threading/unthreading operation three or four times and check that the clearance between the tension regulator drawer lever and the drawer lever stopper meet the required specification.

Adjustment procedure: Adjust the position of the drawer lever stopper.



6-4-2. Tension Regulator Pin Position Adjustment (2)

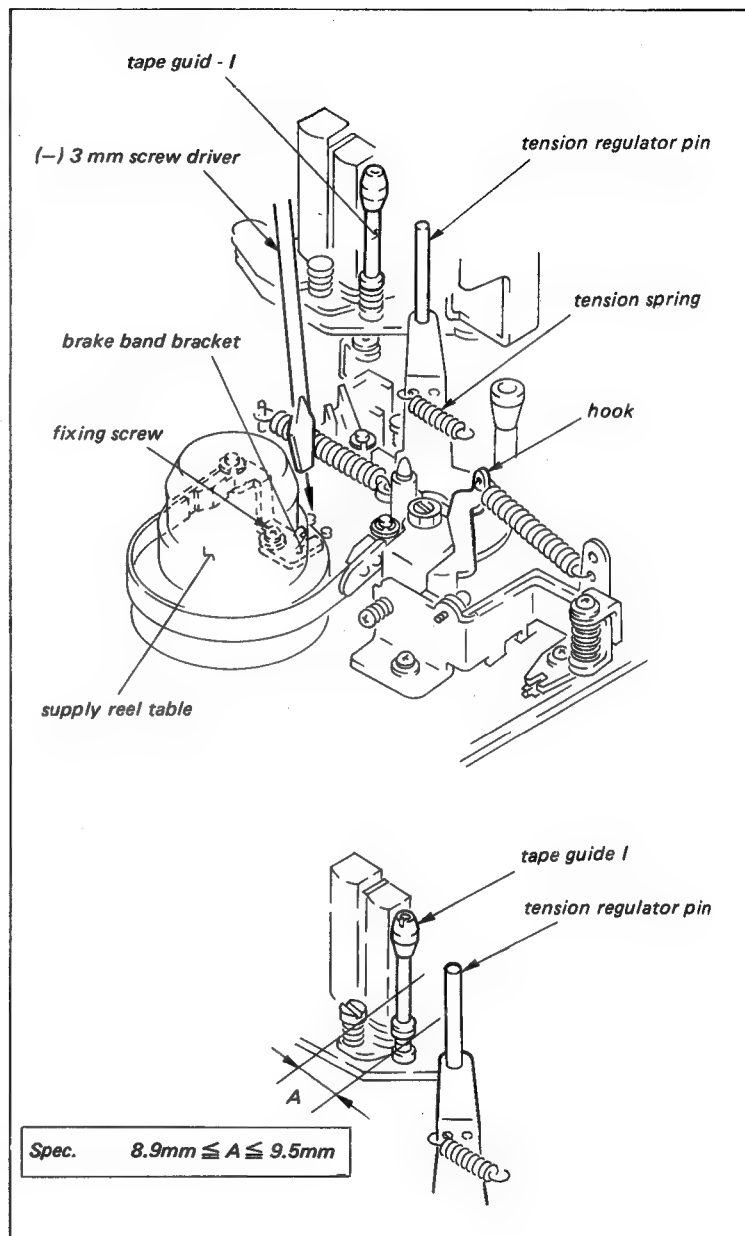
This adjustment determines the limit of the pin operation in the front end (cassette side).

Cassette tape : _____

Mode : Threading end mode

Check and

- adjustment procedure:
- (i) Remove the tension spring of the tension regulator.
 - (ii) Push the tension regulator toward the reel table lightly as long as it will go.
 - (iii) Check the tension regulator pin position meets the required specification.
 - (iv) If not, adjust the position of the brake band bracket.
 - (v) After this adjustment, hook the tension spring to the tension regulator.



6-5. PINCH SOLENOID POSITION ADJUSTMENT

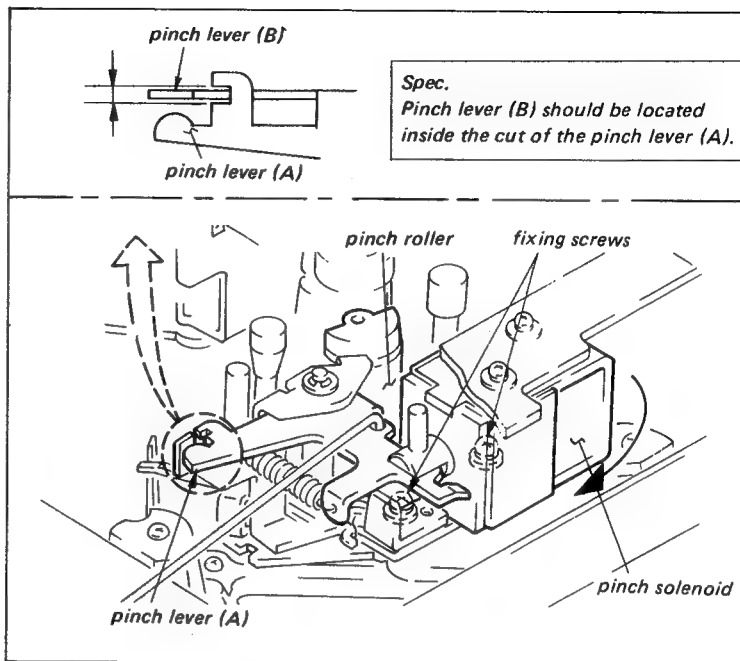
If this adjustment is incorrect, the pinch roller pressure against the capstan may be so low that the tape will not be advanced at the proper speed. And the correct composite shooting being not expected.

Cassette tape : _____

Mode : REC mode

Check procedure: Check that the pinch lever position satisfies the specification as shown below.

Adjustment procedure: Adjust the pinch solenoid position.



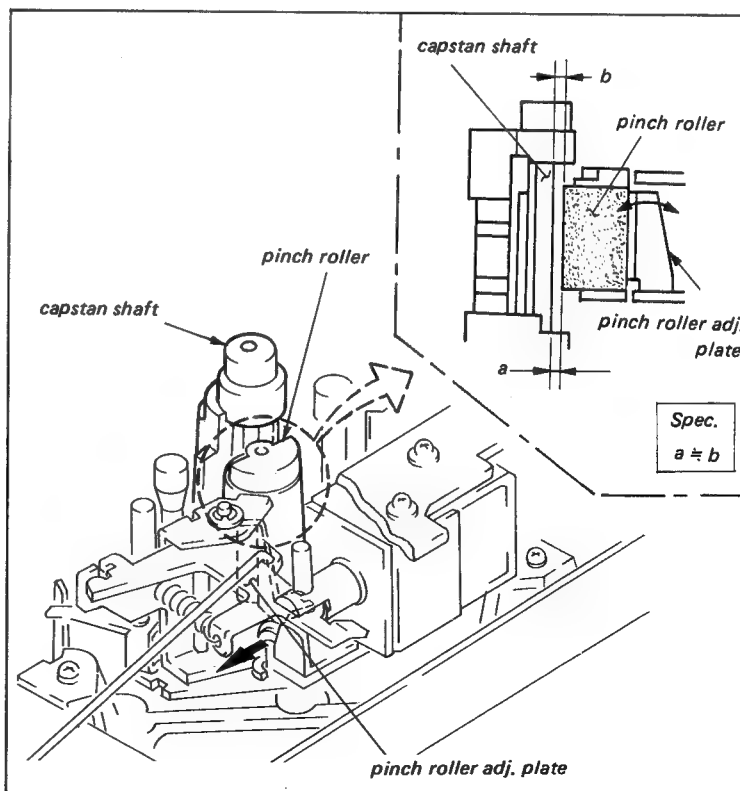
6-6. PINCH ROLLER PRESET ADJUSTMENT

If the upper and lower clearances between the pinch roller and the capstan shaft in the PAUSE mode are not equal, tape wrinkles will be resulted when the pinch roller is pressed on the capstan shaft.

Cassette tape : _____

Mode : Threading end mode

Adjustment procedure: Bend the pinch roller adj. plate in arrow direction.



6-7. PINCH ROLLER POSITION ADJUSTMENT

This adjustment exerts a great influence on the stability and precision of the picture in the composite shooting.

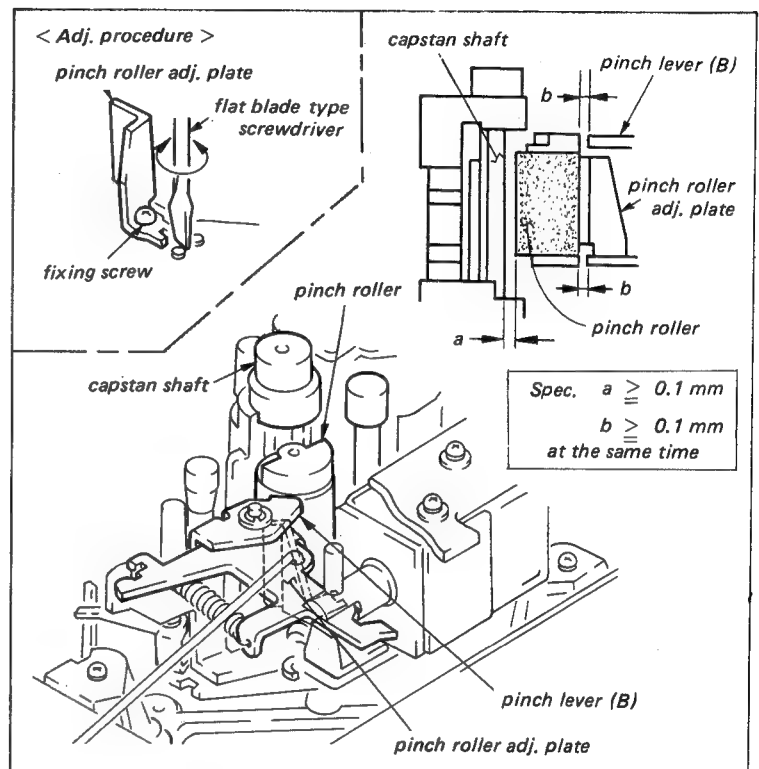
If this adjustment is incorrect, the tape cannot be held between the pinch roller and the pinch roller adj. plate, so composite shooting will not be stable.

Cassette tape : _____

Mode : Threading end mode

Check procedure: Check that the pinch roller position satisfies the specification below.

Adjustment procedure: Adjust the pinch roller adj. plate position.



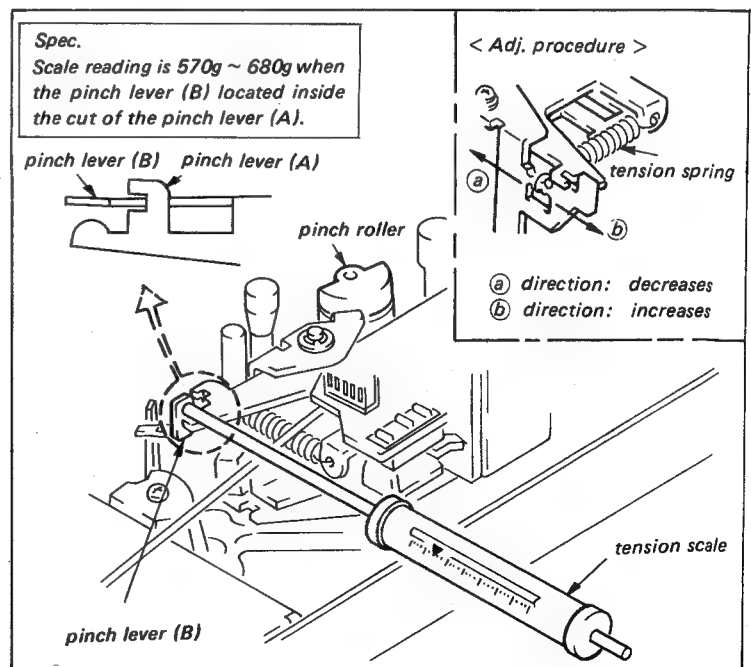
6-8. PINCH ROLLER PRESSING POWER AGAINST THE CAPSTAN SHAFT ADJUSTMENT

Cassette tape : _____

Mode : EJECT mode

Equipment : Tension scale, 1,000g full scale

Adjustment procedure: Select the proper spring hook



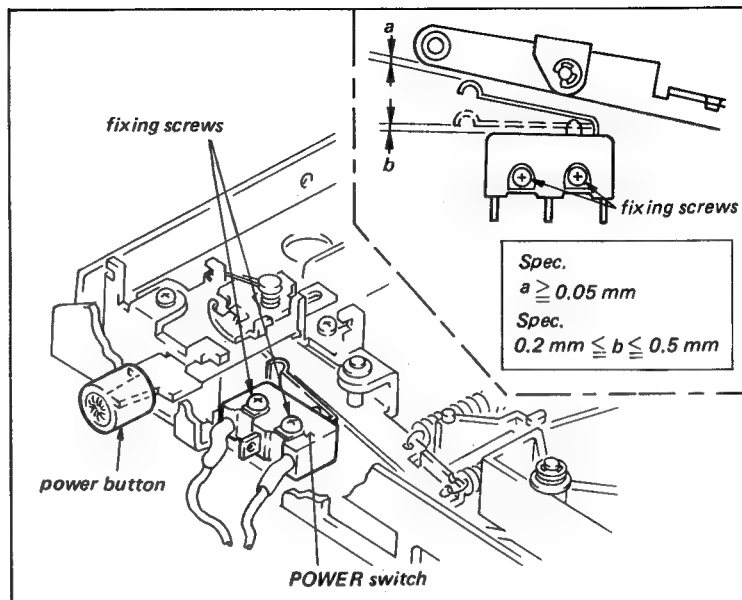
6-9. SWITCH SYSTEM ADJUSTMENT

6-9-1. Power Switch Position Adjustment

Cassette tape : _____

Mode : POWER switch ON/OFF mode

Adjustment procedure: Adjust the POWER switch position.



6-9-2. Miss-rec Switch Position Adjustment

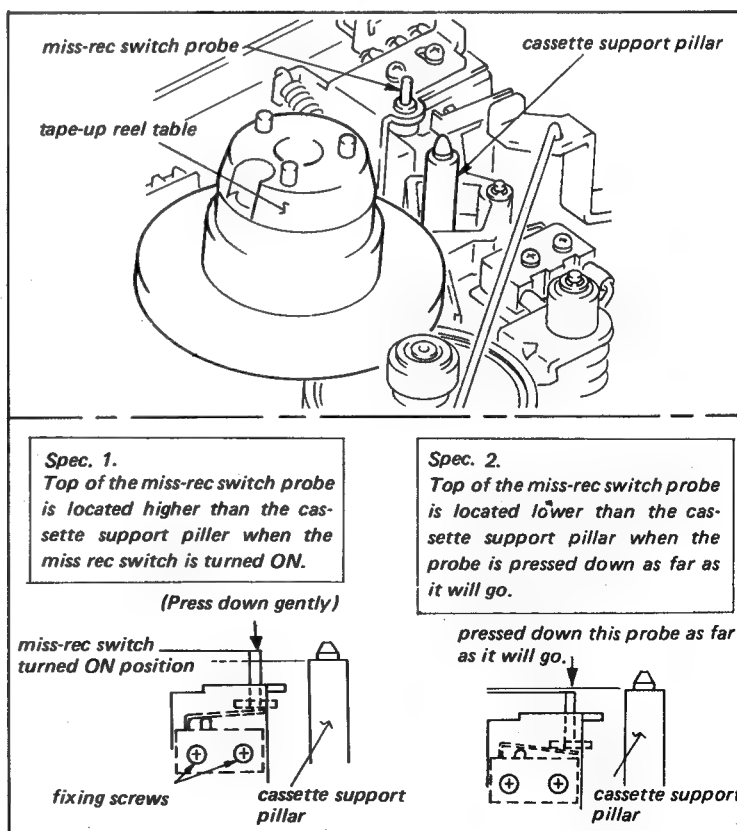
This adjustment cannot be performed in the state that the miss-rec switch is attached on the machine. So check first that the miss-rec switch position is correct. If not, remove the switch block from the machine for the adjustment.

Cassette tape : _____

Mode : Threading end mode

Check procedure: Check that the miss-rec switch probe position satisfies the spec. as shown below.

Adjustment procedure: Adjust the miss-rec switch position.



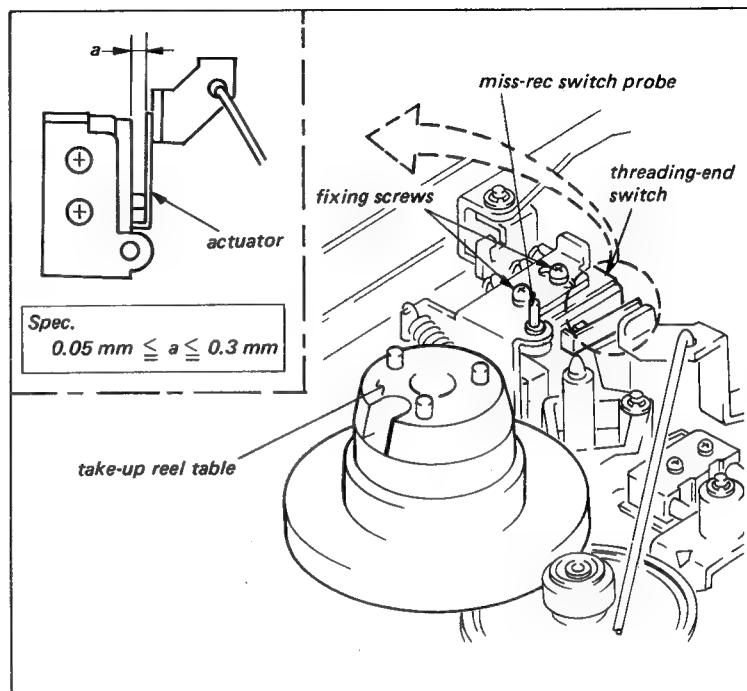
6-9-3. Threading-end Switch Position Adjustment

If this micro-switch does not turn on at the threading-end, the threading DC motor does not stop its rotation.

Cassette tape : _____
 Mode : Threading end mode
 Check procedure: Turn off the POWER once, turn it ON again, and confirm while pushing the miss-rec switch probe that the specified value mentioned below is satisfied.

Put the machine into the threading/unthreading operation three or four times and check the clearance a every times.

Adjustment procedure: Adjust the threading end switch position.



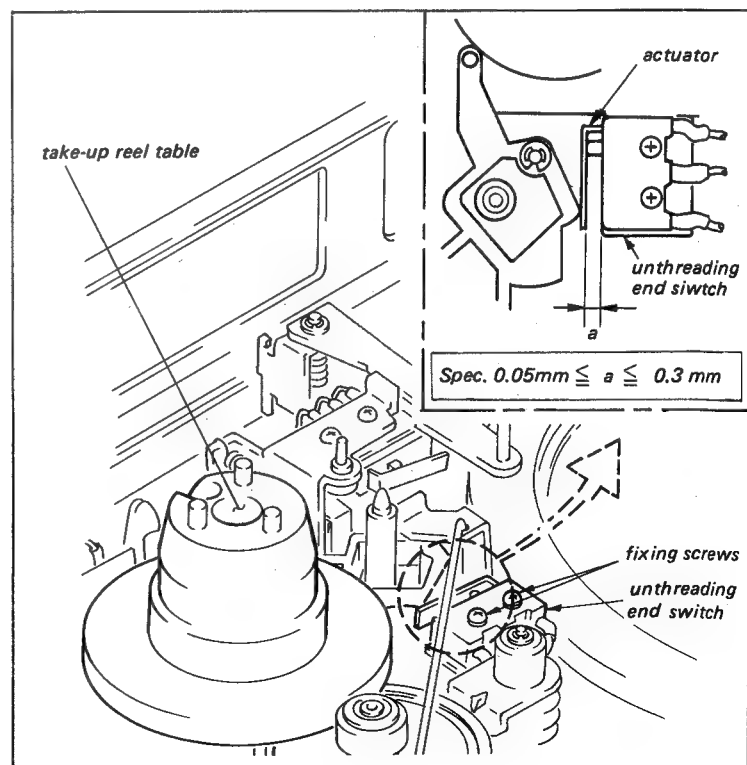
6-9-4. Unthreading-end Switch Position Adjustment

If the unthreading-end switch position is not adjusted properly, the rotation of the threading DC motor will not stop even if the POWER switch is turned off and the EJECT mode is set up.

Cassette tape : _____
 Mode : Threading end mode
 Check procedure: Check that the switch is turned on at the threading-end and off at the unthreading-end.

Put the machine into the threading/unthreading operation three or four times and check the clearance a every times.

Adjustment procedure: Adjust the unthreading end switch position.



6-9-5. Pinch Switch Position Adjustment

When the REC button is pushed in the threading end mode current flows into the pinch solenoid to be energized. Once it is energized, the energized state is maintained by the permanent magnet incorporated in the pinch solenoid so that current can be cut off. The signal which cuts off the current is generated by the pinch switch mounted on the CN-16 board.

When the REC button is pressed or the EJECT knob is pushed in the REC mode, current flows in the pinch solenoid where direction of current is reversed in order to defeat the permanent magnet for releasing the solenoid core from its energized state. If the pinch switch remains in the OFF state even after the solenoid has been energized, the reversed direction current does not flow in the solenoid even if the REC button is pushed or EJECT knob is pushed; and the pinch solenoid cannot be returned to the threading end position. (The pinch roller has been pressed onto the capstan shaft.) The PAUSE operation cannot be performed.

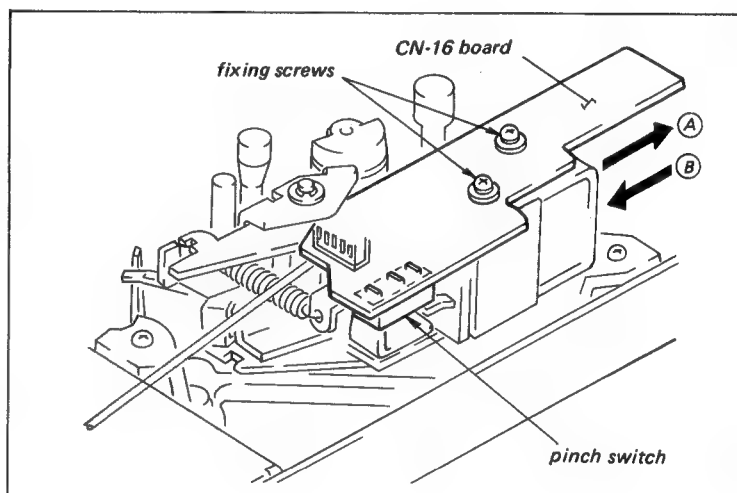
Cassette tape : _____

Input signal : Ordinary video signal

Mode : REC mode

Check procedure: Push the REC button three or four times repeatedly and confirm that the pinch solenoid actuates on and off.

Adjustment procedure: Adjust the CN-16 board position. (Move the CN-16 board once in the (A) direction. Then move the board slowly in the (B) direction until the pinch switch on the CN-16 board is turned ON. Secure the CN-16 board after the board is moved further by 0.3 mm to 0.5 mm from the point where the switch is turned ON.)



SECTION 7

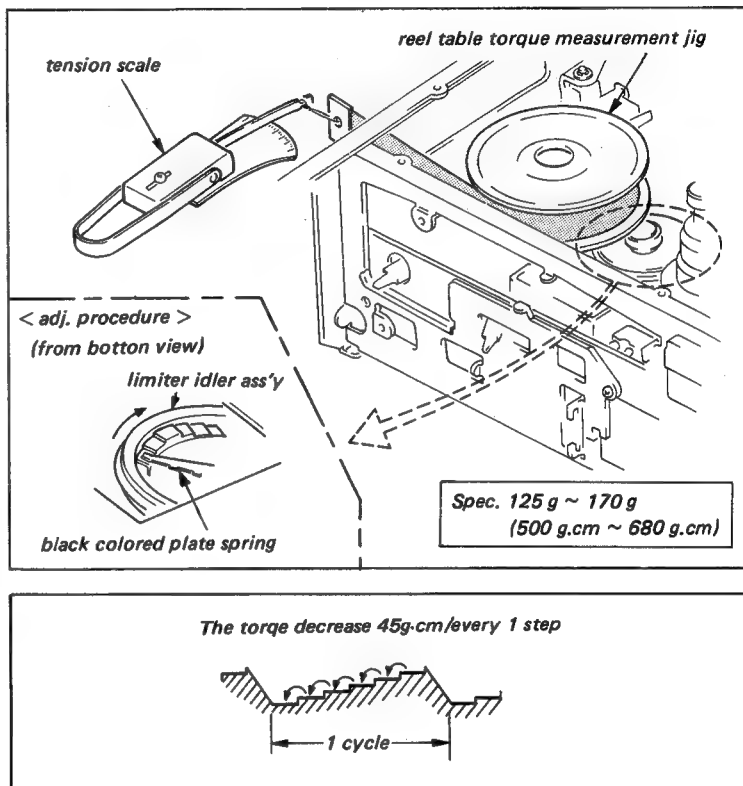
BACK TENSION AND TORQUE ALIGNMENT

7-1. TAKE-UP TORQUE ADJUSTMENT

If the rotation of the take-up reel table is stopped more than 0.7 seconds during the measurement of the take-up torque, the tape slack detector system under take-up reel table functions and puts machine into STOP mode.

Perform the OFF/ON of the POWER switch when the tape slack detector functions and the circuit condition is restored to its original condition.

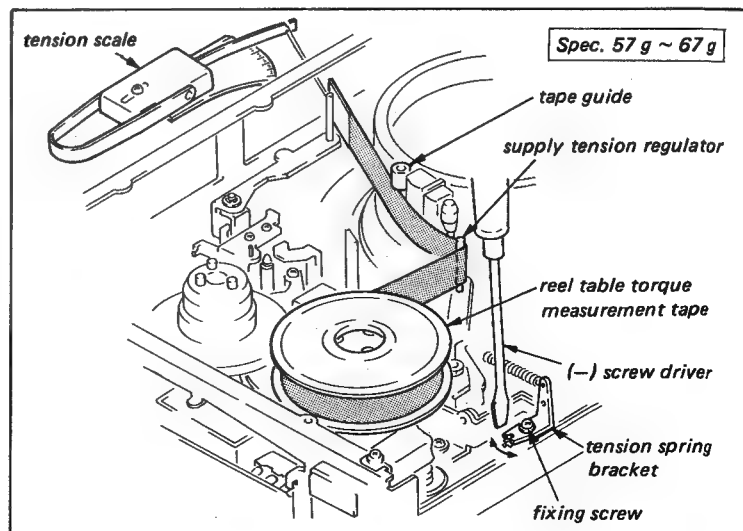
- Cassette tape : _____
 Input signal : Ordinary video signal
 Mode : REC mode
 Equipment : Reel table torque measurement jig (80φ)
 : Tension scale; 200g full scale
- Check procedure: (i) Install a jig tape on the take-up reel table
 (ii) Hook a tension scale
 (iii) Let the pulled at the constant speed of approx. 9.5 cm/sec.
 (iv) Check that the scale reading is in the specified value.
- Adjustment procedure: (i) Remove the battery case of the bottom.
 (ii) Hold the black colored plate spring by (-) screw-driver.
 (iii) Rotate the limiter idler ass'y by hand in the clockwise direction as viewed from the bottom. (The torque can be adjusted by changing the spring position.)



7-2. FWD BACK TENSION ADJUSTMENT

The method of measuring the FWD back tension in this section is simplified. The ideal method is to measure FWD back tension when the tape is actually running. The difference between a value obtained by using this simplified method of measurement and a value obtained by the ideal method of measurement is allowed for in the specification.

- Cassette tape : _____
 Input signal : Ordinary video signal
 Mode : REC mode
 Equipment : Reel table torque measurement jig (80φ)
 : Tension scale; 100g full scale
- Check procedure: (i) Install a jig tape on the supply reel table
 (ii) Hook a tension scale
 (iii) Pull out the tape at the constant speed of approx. 9.5 cm/sec in the direction as shown below.
- Adjustment procedure: Adjust the position of tension spring bracket.



7-3. BRAKE SYSTEM ADJUSTMENT

This machine has the following brakes:

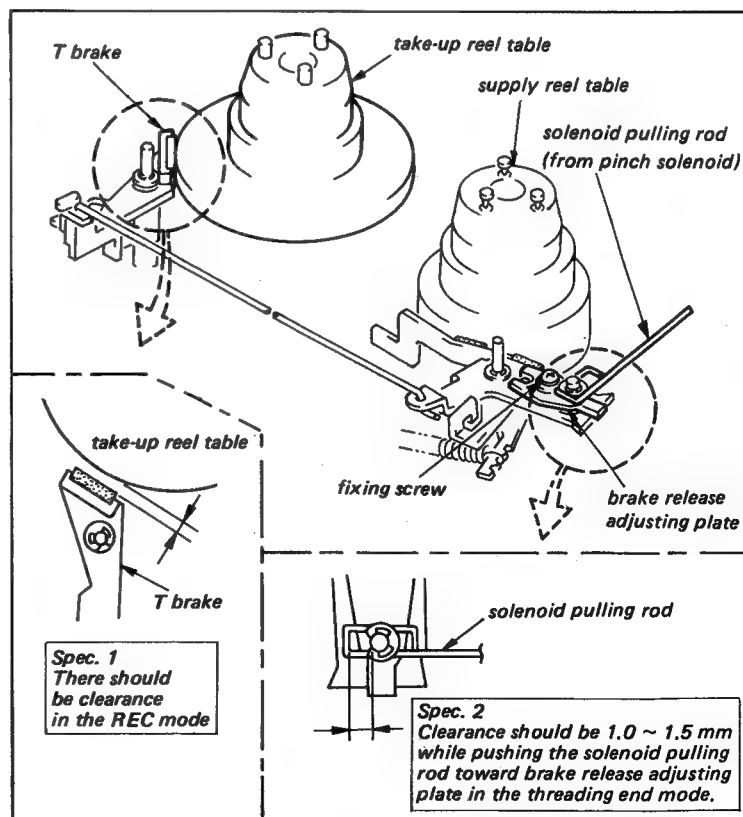
- Take-up reel main brake
- Supply reel main brake (for threading back tension)
- FWD back tension brake band

Operation of each brake is shown below.

Modes \ Reel table	Take-up reel table	Supply reel table
Cassette-up/POWER OFF (Eject completed)	Brake shoe is ON.	Free (But take-up idler tire is ON.)
Cassette-up/ POWER ON (Eject completed)	Brake shoe is ON.	Brake shoe is ON.
Cassette in → threading end (during threading)	Brake shoe is ON.	Brake shoe is ON. (Supply reel supplies the tape.)
Threading end	Brake shoe is ON.	Brake shoe and back tension brake band are ON.
During REC	Free (Takes up tape onto the take-up reel)	Back tension brake band is ON. (Supply reel supplies the tape.)
During PAUSE	Brake shoe is ON.	Brake shoe and back tension brake band are ON.
During unthreading	Brake shoe is ON.	Free (Takes up tape onto the supply reel)

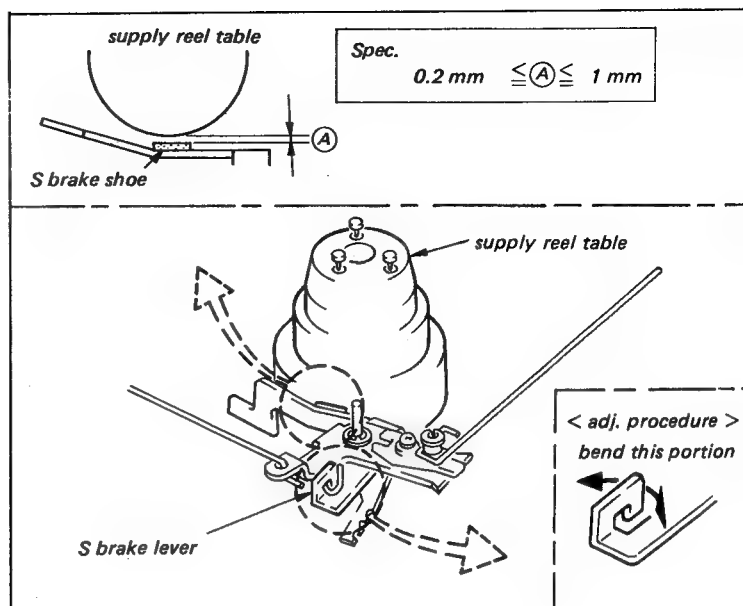
7-3-1. Take-up Brake Release Adjustment

- Cassette tape : _____
- Input signal : Ordinary video signal
- Mode : Spec. 1 ----- REC mode
Spec. 2 ----- threading end mode.
- Check procedure: Check the brake system referring table- 7-1.
- Adjustment procedure: Adjust the position of the brake release adjusting plate for the spec. 1 and 2.



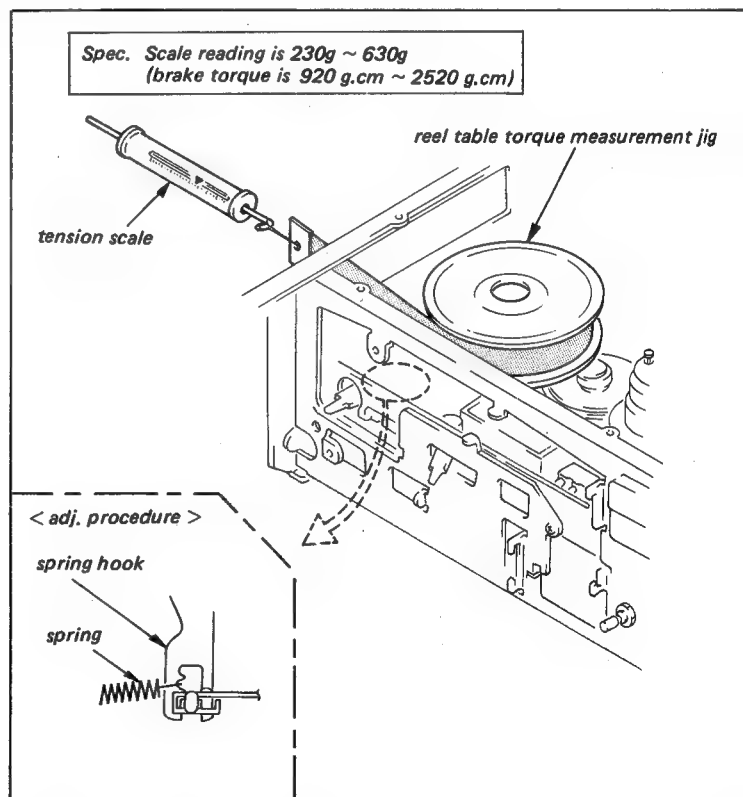
7-3-2. Supply Brake Release Adjustment

Cassette tape : _____
 Mode : REC mode
 Check procedure: Check the brake system referring table-7-1.
 Adjustment procedure: Bend the S brake lever



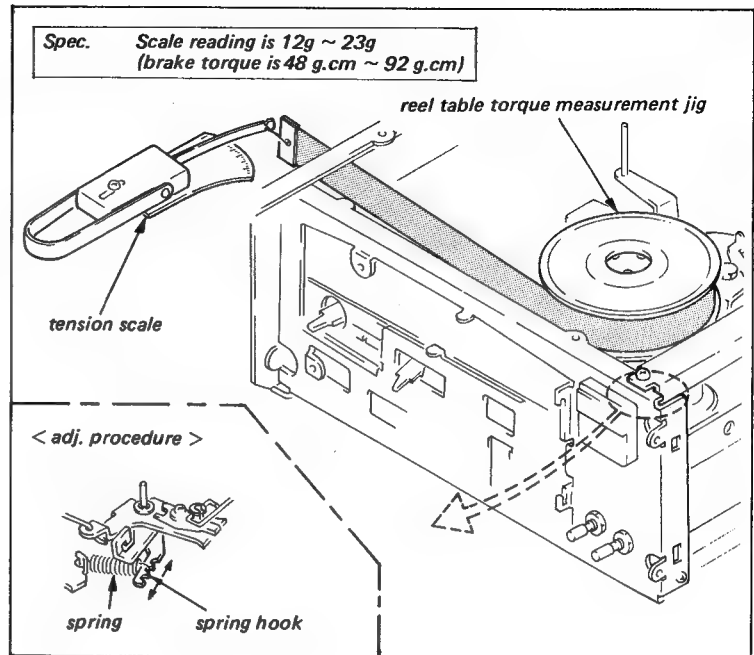
7-3-3. Take-up Reel Table, Brake Torque Adjustment

Cassette tape : _____
 Mode : EJECT and POWER OFF modes.
 Equipment : Reel table torque measurement jig (80φ)
 Tension scale, 1000g full scale
 Check procedure: (i) Install a jig tape on the take-up reel table
 (ii) Hook a tension scale.
 (iii) Pull out the tape at the constant speed of approx. 9.5 cm/sec.
 (iv) Check that the scale reading is in the specified value.
 Adjustment procedure: Select the proper spring hook.



7-3-4. Supply Reel Table, Brake Torque Adjustment

- Cassette tape : _____
 Mode : EJECT and POWER ON modes.
 Equipment : Reel table torque measurement jig (80φ)
 : Tension scale; 50g full scale
 Check procedure: (i) Install a jig tape on the supply reel table
 (ii) Hook a tension scale
 (iii) Pull out the tape at the constant speed of approx. 9.5 cm/sec.
 (iv) Check that the scale reading is in the specified value.
 Adjustment procedure: Select the proper spring hook.



SECTION 8

TAPE RUN ALIGNMENT

- Since the BVU-50P/-50S is a recording only machine, so the video/audio/time code track position adjustment, the CTL head position adjustment, the video head dihedral adjustment, the composite shooting adjustment and the video head azimuth adjustment became very complicated.
- The BVU-50 PB check jig is available for making the track position adjustments of the video/audio/time code heads and the video head azimuth adjustment easy. Here in this section, two adjustment procedures are described. One is the procedure using the PB check jig and the other is the procedure using a correctly adjusted playback machine (ex. BVU-200P/-200S).
- The CTL head position adjustment, the video head dihedral adjustment and the composite shooting adjustment are performed by a cut and try method, i.e., to check the playback of a tape recorded on the BVU-50P/-50S on a correctly adjusted BVU-200P/-200S and to adjust the BVU-50P/-50S, when the BVU-50P/-50S is found to need more adjustment.

(Preparation-1)

Before a BVU-200P/-200S is to be used as the playback machine, be sure to check the following points for setting the machine for the optimum condition for the adjustment. (Please refer to the BVU-200P/-200S Manual, as to the adjustment procedures.)

- (i) Check that the tape path (tracking) and the head-to-tape contact of the video head are correctly adjusted. (The tape path and head-to-tape contact should be done as well as possible.)
- (ii) Check that the audio head height adjustment is correctly adjusted. (The height adjustment should be done at the center of the value.)
- (iii) Check that the azimuth and phase of the audio head are correctly adjusted. (The adjustment value should be done at the center of the specification.)
- (iv) Check that the audio/CTL head position is correctly adjusted. (The adjustment value should be done at the center of the specification.)
- (v) Check that the time code head position is correctly adjusted. (The adjustment value should be done at the center of the specification.)
- (vi) Check that the video head dihedral adjustment is done correctly. (The adjusted value should be done at the center of the specification.)

(Preparation-2)

1. Short base and ground of Q2 on the AR-8 board, with jumper. (This jumper stops the full erase circuit operation.)
2. Open the SM-19/-20 board in the rear of the machine, and disconnect the connector CN103. Find the harness that has disconnected the CN103 through an opening of chassis near threading motor, in the rear of the machine. Drag the harness out of the opening. Close the SM-19/-20 board. Fasten with screw. Connect the CN103 of the harness connector to the CN103 connector of the jig. (This connection supplies the video head output signal to the jig.)
3. Remove the connector of the CN-16 board's CN614 of the pinch solenoid on top of the machine. Connect the jig's connector CN614 to this harness. (This connection supplies the audio head output signal to the jig.)
4. Open the AR-8 board on the right side of the machine and disconnect the connector CN206. Connect the jig's connector CN206 to the harness's connector CN206. (This connection supplies time code head output signal to the jig.)
5. Find the SM-19/-20 board (soldering side) connector CN102 pins No. 4/5/6 on the rear of the machine. Solder the red lead wire of the jig. (REG 9V) to the CN102 pins No.4/5/6. Connect the jig's black lead wire (GND) to the SM-19/-20 board CN104 pins No. 1/2/3/4 by soldering. (This connection supplies power to the jig.)
6. Feed a video signal to the VIDEO IN or to the CAMERA connector of the machine.
7. Put a red cap on the erroneous-erasure-prevention-hole on the bottom of the alignment tape. (Use the red cap supplied with ordinary KCA or KCS type cassette.)
8. Insert an alignment tape to the machine and press the REC button.

8-1. TAPE RUN ADJUSTMENT (1)

This adjustment is for the correct tape running position so that the tape fed out from the capstan section can be taken up by take-up reel in a stable condition.

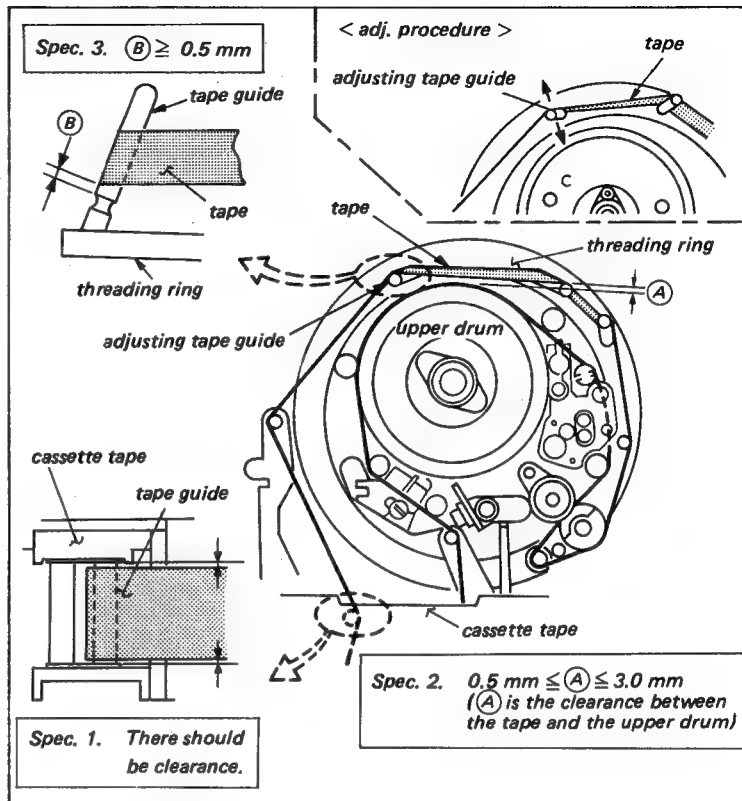
Cassette tape : KSC-20 video cassette tape

Input signal : Ordinary video signal

Mode : REC mode

Check procedure: Check that the tape running position satisfies the specifications.

Adjustment procedure: Bend the tape guide on the threading ring in the arrow direction.



8-2. TAPE RUN ADJUSTMENT (2)

This adjustment is for the correct slantness of the pinch roller so that a crease is not made on the tape when the pinch roller is pressed on the capstan shaft.

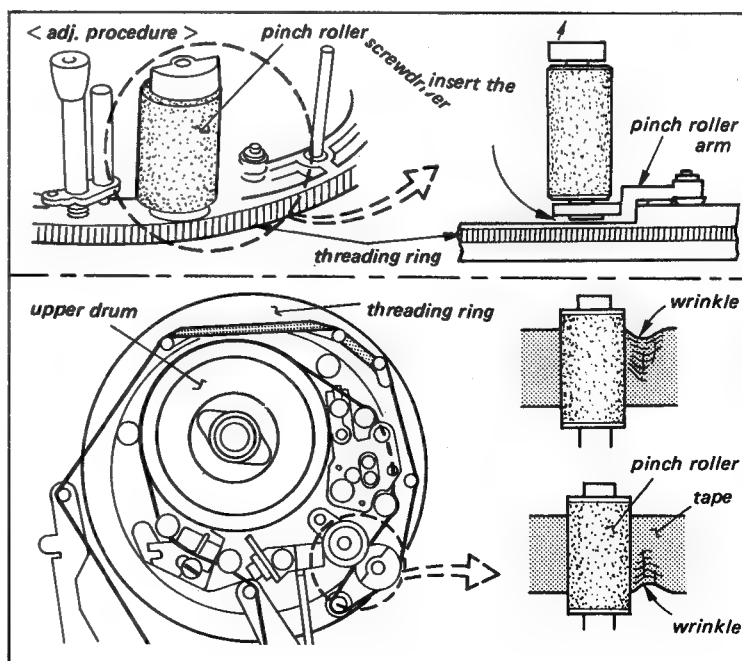
Cassette tape : KCS-20 video cassette tape

Input signal : Ordinary video signal

Mode : REC mode

Check procedure: Check that the tape wrinkle does disappear within three seconds in the moment of pinch roller's pressing against the capstan shaft.

Adjustment procedure: (i) Push the POWER button
(ii) Disconnect the DC plug in the moment when the pinch roller comes to the rear panel.
(iii) Bend the pinch roller arm in the arrow direction by using (-) 2 mm screw driver.



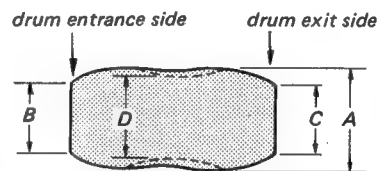
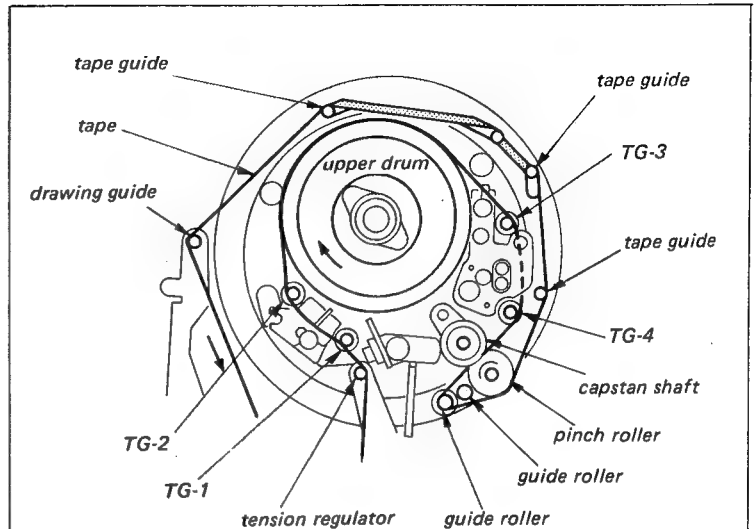
8-3. TRACKING ADJUSTMENT

(I) When BVU-50 PB check jig is used:

- Cassette tape : Alignment tape; color-bar or monoscope portion.
- Input signal : Ordinary video signal
- Equipment : BVU-50 PB check jig.
Oscilloscope
Alignment tape RR5-2SB PAL or
Alignment tape RR5-2SB SECAM
- Mode : REC mode. (But the alignment tape is playing back mode by using the PB check jig.)
- Check procedure: Confirm that the RF envelope is within the specification at VIDEO chA + B terminal on the jig.
- Adjustment procedure: (1) Adjust height of the tape guides (TG-1, TG-2, TG-3, TG-4)
- (2) If the specification cannot be satisfied by step (1), adjust slantness of the supply side tension regulator as follows.
(However, do not adjust the supply side tension regulator, as much as possible.)
- (i) Loosen an allen type fixing screw $\frac{1}{2} \sim 1$ turn.
- (ii) Adjust the just tracking to turn the slantness adj. screw. Do not turn this screw more than $\frac{3}{4}$ turn in both directions.
- (3) If the specification cannot be satisfied by steps (1) and (2), adjust slantness of the TC head as follows.
- (i) Loosen the fixing screw.
- (ii) Set the flatness plate on the TC head and TG-2.
- (iii) Slant the TC head within the specified value so that the RF envelope satisfies the specification.

(II) When BVU-200P/-200S is used:

- Cassette tape : KCS-20 cassette tape
- Input signal : Ordinary video signal
- Equipment : BVU-200P/-200S
Oscilloscope
- Mode : Record the video signal on the BVU-50P/-50S. Playback of the recorded segment on the BVU-200P/-200S.
- Check procedure: The RF envelope waveform of the BVU-200P/-200S should satisfy the specification of the alignment tape.
- Adjustment procedure: Perform the same adjustment procedure with step (I) for satisfying the specification.



When the RF envelope is maximum amplitude.

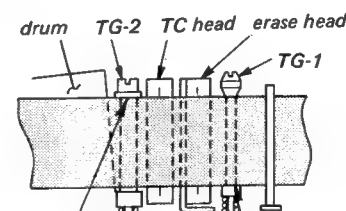
Spec. 1. Tape-to-head contact

$$\frac{B}{A} \geq 0.75, \frac{C}{A} \geq 0.75$$

Fluctuation of amplitude

$$\frac{D}{A} \geq 0.9$$

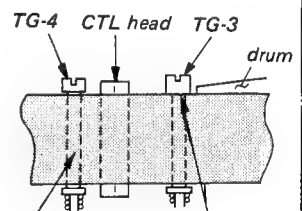
Spec. 2 < drum entrance side >



Tape runs in contact with upper flange

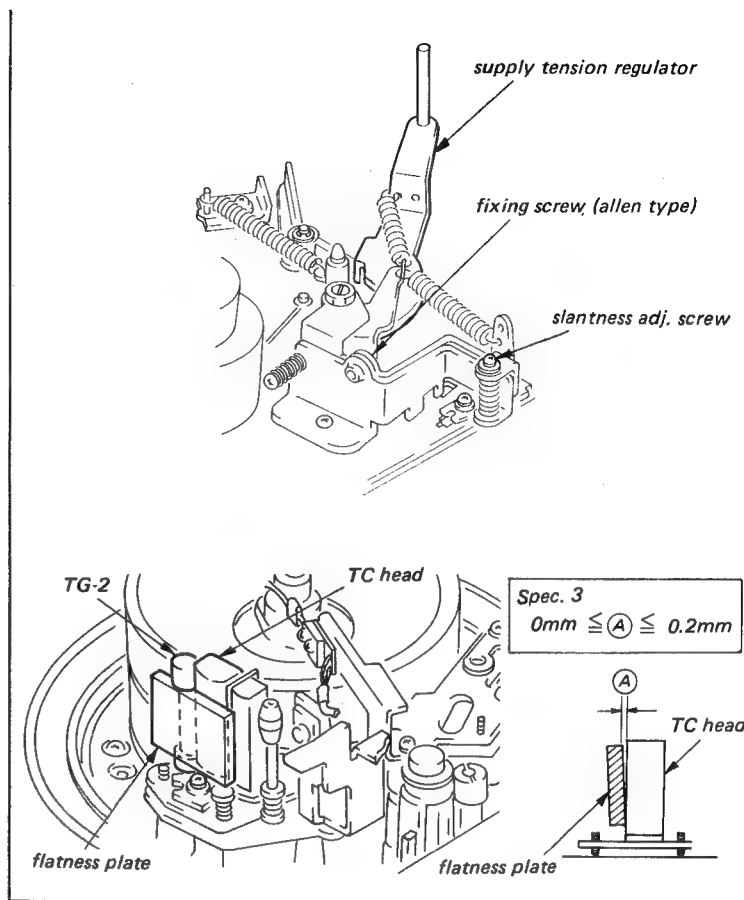
Tape runs in contact with lower flange

< drum exit side >



Tape runs in the center of tape guide

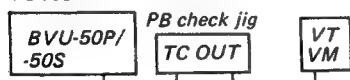
Tape runs in contact with upper flange



8-4. TC HEAD HEAD-TO-TAPE CONTACT ADJUSTMENT

(I) When BVU-50 PB check jig is used:

Cassette tape : Alignment tape; color-bar portion
(Time code output level is about -30 dB.)
Input signal : Ordinary video signal
Equipment : BVU-50 PB check jig.
VTVM



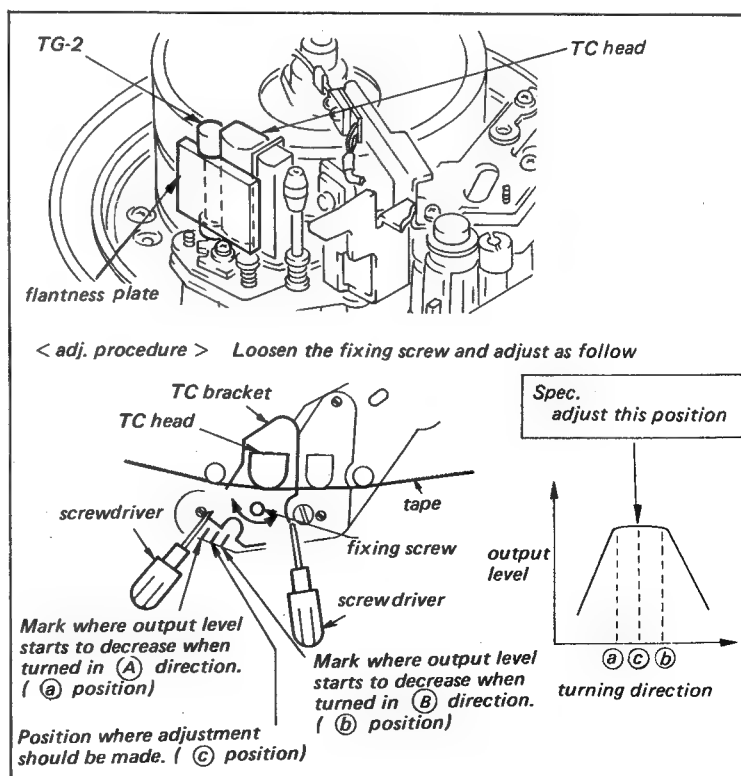
Alignment tape RR5-2SB PAL or
Alignment tape RR5-2SB SECAM

Mode : REC mode

Adjustment procedure: Adjust the position of TC head
for the maximum output level.

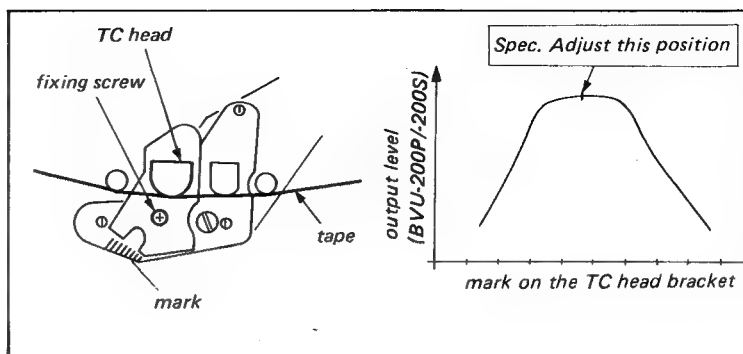
(II) When BVU-200P/-200S is used:

Cassette tape : KCS-20 cassette tape
Input signal : Ordinary video signal
1.0kHz (1.55Vp-p) square wave or 1.0
kHz (4Vp-p) sine wave to be connected
to the TIME CODE IN terminal.
Equipment : Audio oscillator
VTVM
Microphone (600Ω, with XLR con-
nector)
Video monitor
BVU-200P/-200S



Mode : Record the video signal and the time code signal on the BVU-50P/-50S. Playback of the recorded segment on the BVU-200P/-200S.

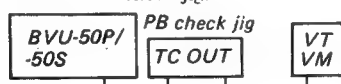
- Adjustment procedure;
- (i) Put marks on the time code head section of the BVU-50P/-50S as shown in the figure.
 - (ii) Loosen the TC head fixing screw about $\frac{1}{2}$ turn.
 - (iii) Place the cut-out of the TC head bracket to the right end mark.
 - (iv) Set up the REC mode for approx. five seconds and record the mark position with the microphone at the same time.
 - (v) Move the cut-out to the following marks one by one and perform step (iv) at each mark position.
 - (vi) Playback the tape recorded in steps (iv) and (v) on the BVU-200P/-200S. Find the TC OUT level point shown in the figure while confirming the mark positions on the monitor speaker.
 - (vii) Adjust the TC head bracket to the best point found in step (vi).



8-5. TC HEAD HEIGHT ADJUSTMENT

(I) When BVU-50 PB check jig is used:

Cassette tape : Alignment tape; color-bar portion.
Input signal : Ordinary video signal
Equipment : BVU-50PB check jig.



VTVM

Alignment tape RR5-2SB PAL or
Alignment tape RR5-2SB SECAM
(Time code output level is about
-30 dB.)

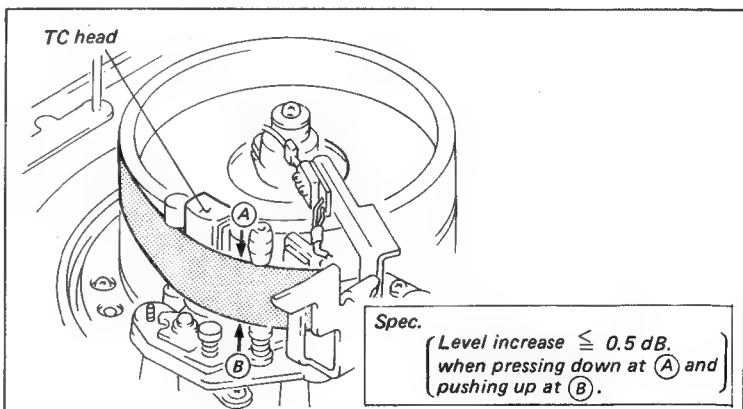
Mode : REC mode

Check procedure: Confirm that the level increase is within the specification at TC OUTPUT terminal on the jig.

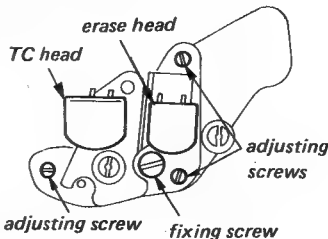
Adjustment procedure: Adjust the height of TC head by turning three adjusting screws.

(II) When BVU-200P/-200S is used:

Cassette tape : KCS-20 cassette tape
Input signal : Ordinary video signal
1.0kHz (1.55Vp-p) square wave or 1.0
kHz (4Vp-p) sine wave to be connected
to the TIME CODE IN terminal.



< adj. procedure >



- (i) Level increase ≥ 0.5 dB when pressing down at (A). ----- loosen the fixing screw and turn 3 adjusting screws in (C).
- (ii) Level increase ≥ 0.5 dB when pushing up at (B). ----- loosen the fixing screw and turn 3 adjusting screws in (C).

Equipment : Audio oscillator
VTVM
BVU-200P/-200S

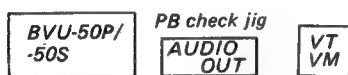
Mode : Record the video signal and the time code signal on the BVU-50P/-50S. Playback of the recorded segment on the BVU-200P/-200S.

Adjustment procedure: Adjust the adjusting screw on the machine for satisfying the specification. (After the adjustment, record the signals on the machine again, playback the recorded tape on the BVU-200P/-200S, and confirm that the specification has been satisfied.)

8-6. AUDIO HEAD HEIGHT ADJUSTMENT

(I) When BVU-50 PB check jig is used:

Cassette tape : Alignment tape, audio 10kHz portion
Input signal : Ordinary video signal
Equipment : BVU-50 PB check jig



VTVM

Alignment tape RR5-2SB PAL or
Alignment tape RR5-2SB SECAM

Mode : REC mode
Check procedure: Confirm that the level increases within the specification at AUDIO OUTPUT terminal on the jig.

Adjustment procedure: Adjust the height by turning three adjusting screws.

(II) When BVU-200P/-200S is used:

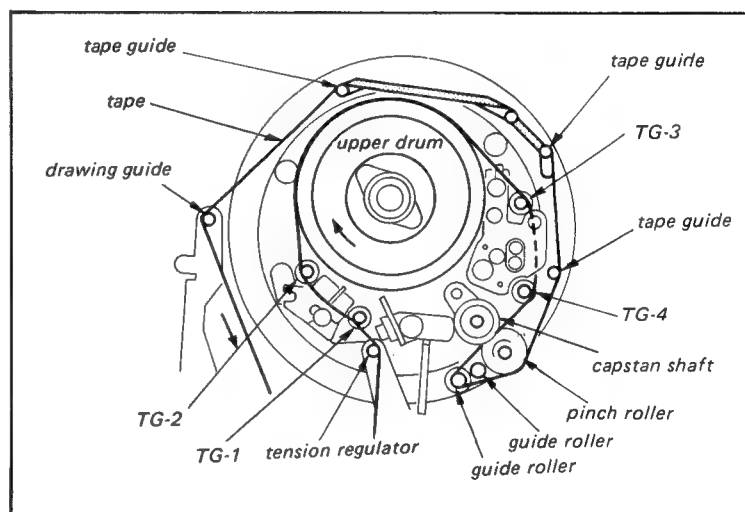
Cassette tape : KCS-20 cassette tape
Input signal : Ordinary video signal
: Audio 10kHz, -60 dB; to the MIC IN terminal

Equipment : Audio oscillator
BVU-200P/-200S
VTVM

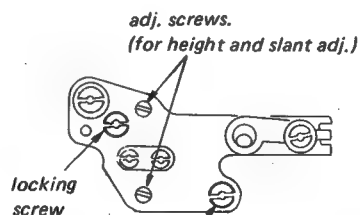
Mode : Record the audio 10kHz signal on the BVU-50P/-50S. Playback of the recorded segment on the BVU-200P/-200S.

Check procedure: The AUDIO OUTPUT signal of the BVU-200P/-200S should satisfy the specification of the alignment tape.

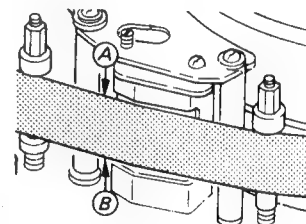
Adjustment procedure: Adjust the adjusting screw on the machine for satisfying the specification. (After the adjustment, record the signals on the machine again, playback the recorded tape on the BVU-200P/-200S, and confirm that the specification has been satisfied.)



< adj. procedure >



adj. screw
(for height and azimuth/phase adj.)



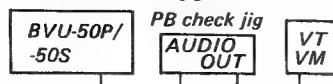
(i) Level increase ≥ 0.5 dB when pressing down at (A). ----- loosen the locking screw and turn 3 adj. screws of exactly equal amount in \curvearrowright .

(ii) Level increase ≥ 0.5 dB when pushing up at (B). ----- loosen the locking screw and turn 3 adj. screws of exactly equal amount in \curvearrowleft .

8-7. AUDIO HEAD AZIMUTH ADJUSTMENT

(I) When BVU-50 PB check jig is used:

Cassette tape : Alignment tape; 10kHz portion
 Input signal : Ordinary video signal
 Equipment : BVU-50 PB check jig



VTVM

Alignment tape RR5-2SB PAL or
 Alignment tape RR5-2SB SECAM

Mode : REC mode

Adjustment procedure: Adjust the maximum output level by turning adj. screw.

(II) When BVU-200P/-200S is used:

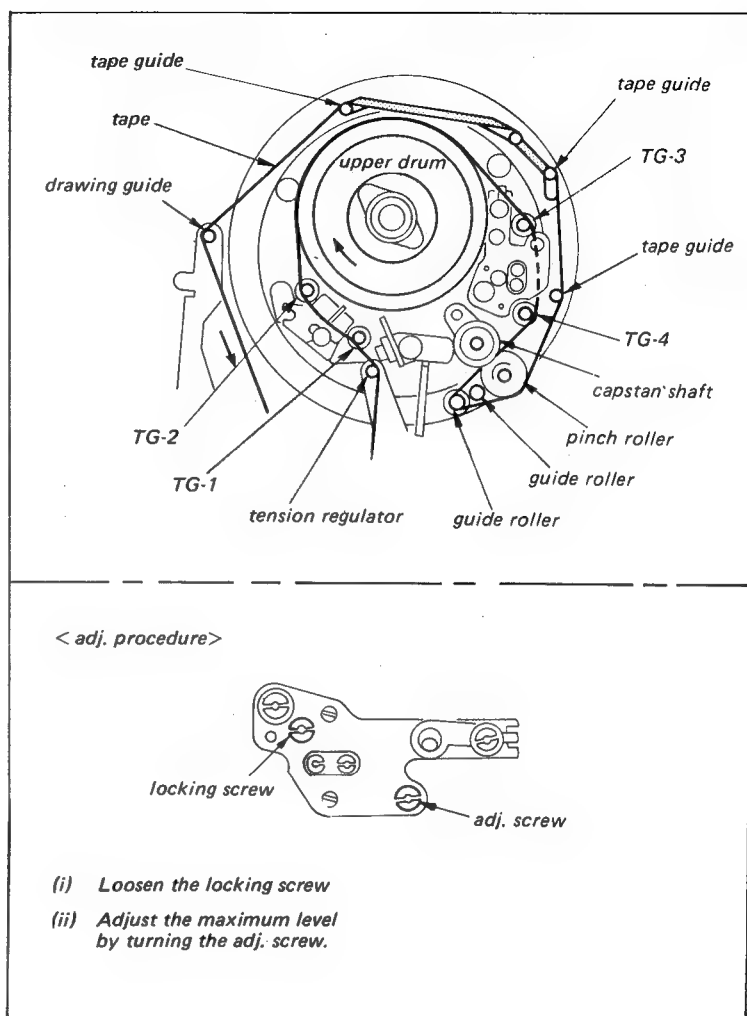
Cassette tape : KCS-20 cassette tape
 Input signal : Ordinary video signal
 : Audio 10kHz, -60 dB; to the MIC IN terminal

Equipment : Audio oscillator
 BVU-200P/-200S
 VTVM

Mode : Record the audio 10kHz signal on the BVU-50P/-50S. Playback of the recorded segment on the BVU-200P/-200S.

Check procedure: The AUDIO OUTPUT signal of the BVU-200P/-200S should satisfy the specification of the alignment tape.

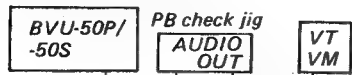
Adjustment procedure: Adjust the adjusting screw on the machine for satisfying the specification. (After the adjustment, record the signals on the machine again, playback the recorded tape on the BVU-200P/-200S, and confirm that the specification has been satisfied.)



8-8. AUDIO HEAD PHASE ADJUSTMENT

(I) When BVU-50 PB check jig is used:

Cassette tape : Alignment tape, 1kHz and 10kHz portion
 Input signal : Ordinary video signal
 Equipment : BVU-50 PB check jig



Oscilloscope, dual trace
 Alignment tape RR5-2SB PAL or
 Alignment tape RR5-2SB SECAM

Mode : REC mode

Check procedure: (i) Confirm that the vertical amplitude at the center in the horizontal direction is within the specification at 1kHz portion of tape.
 (ii) Confirm that the lissajous waveshape is within 90 deg. at 10kHz portion of tape.

Adjustment procedure: Adjust the correct phase by turning adj. screw.

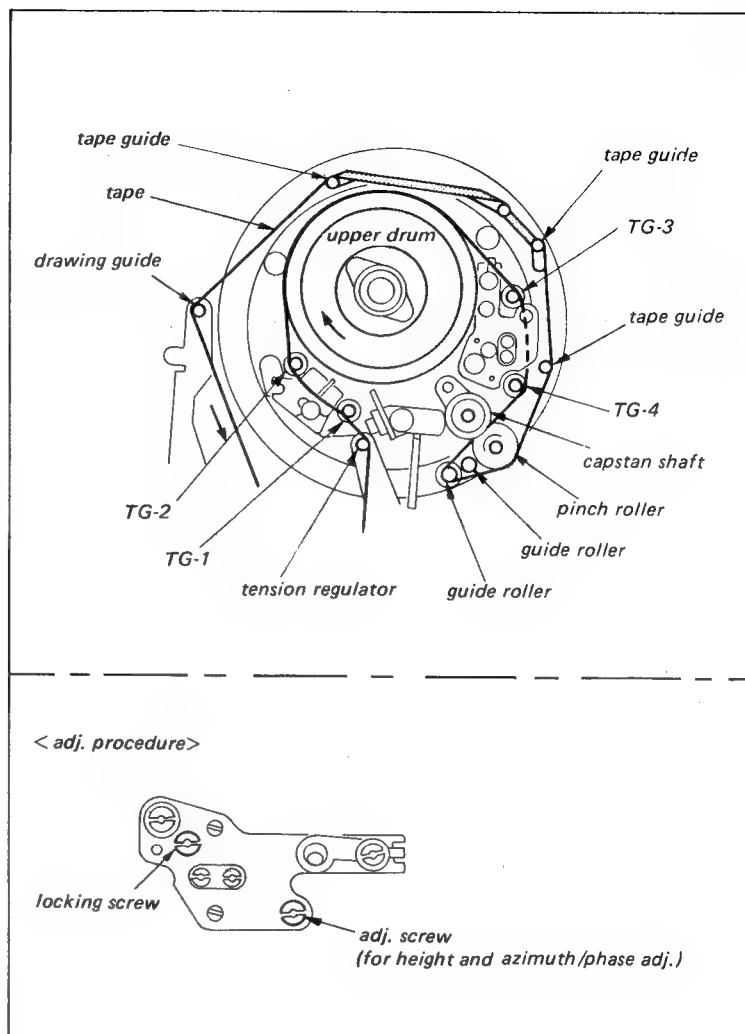
(II) When BVU-200P/-200S is used:

Cassette tape : KCS-20 cassette tape
 Input signal : Ordinary video signal
 Audio 1kHz, -60 dB/10kHz, -60 dB; to MIC IN terminal
 Equipment : BVU-200P/-200S
 Dual trace oscilloscope
 Audio oscillator

Mode : Record the audio 1kHz/10kHz signal on the BVU-50P/-50S. Playback of the recorded segments on the BVU-200P/-200S.

Check procedure: The phase of the BVU-200P/-200S should satisfy the specification of the alignment tape.

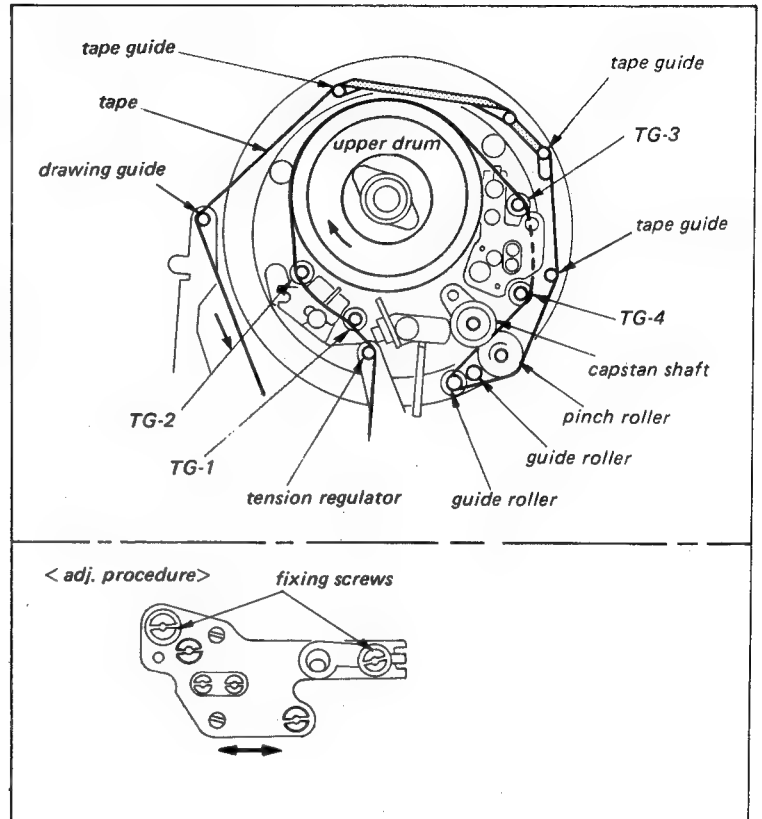
Adjustment procedure: Adjust the adjusting screw on the machine for satisfying the specification. (After the adjustment, record the signals on the machine again, playback the recorded tape on the BVU-200P/-200S, and confirm that the specification has been satisfied.)



8-9. CTL HEAD POSITION ADJUSTMENT

The BVU-50 PB check jig cannot be utilized for this adjustment. Playback the tape recorded on the BVU-50P/-50S on the BVU-200P/-200S whose CTL head position is known to be adjusted correctly and adjust the CTL head position on the BVU-50P/-50S so that its position satisfies the specification.

- Cassette tape : KCS-20 video cassette tape
 Input signal : Ordinary video signal
 Equipment : BVU-200P/-200S
 Oscilloscope
 Mode : Record the video signal on the BVU-50P/-50S. Playback of the recorded segment on the BVU-200P/-200S.
 Check procedure: Check that the RF envelope waveform has the maximum amplitude when the TRACKING control is set in the mechanical center.
 Adjustment procedure: Adjust the position of the CTL head of BVU-50P/-50S to satisfy the specification.



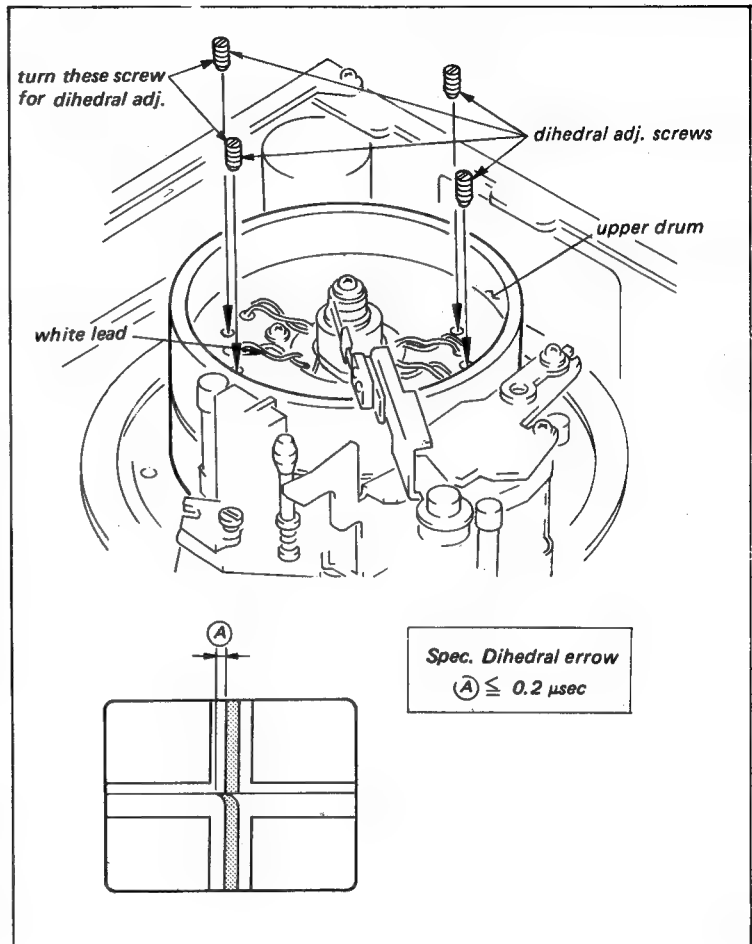
8-10. VIDEO HEAD DIHEDRAL ADJUSTMENT

The BVU-50PB check jig cannot be utilized for this adjustment. Playback the tape recorded on the the BVU-50P/-50S on the BVU-200P/-200S whose video head dihedron is known to be adjusted correctly.

Cassette tape : KCS-20 cassette tape
Input signal : Ordinary video signal
Equipment : BVU-200P/-200S
Dihedral adjusting screw
Video monitor (Conrac)
Mode : Record the video signal on the BVU-50P/-50S. Playback of the recorded segment on the BVU-200P/-200S.
Check procedure: Check that the distortion of sync signal at the switching position should be within the specification when the monitor is in the PULSE CROSS mode.

Adjustment procedure: Adjust the video head with white leads as follows.

- (i) Mount four pieces of dihedral adjusting screws into the upper drum. Turn these screws lightly.
- (ii) Turn either one of the two adjusting screws until some stiff feeling is felt.
- (iii) If this screw is turned further-more, dihedral adjustment is made by moving the video head. So turn this screw an additional quater turn.
- (iv) Record the video signal on the BVU-50P/-50S again. Playback the recorded segment on the BVU-200P/-200S.
- (v) If got worse, turn this screw counterclockwise and turn the other screw.
- (vi) Repeat steps (i) through (v) for the adjustment.



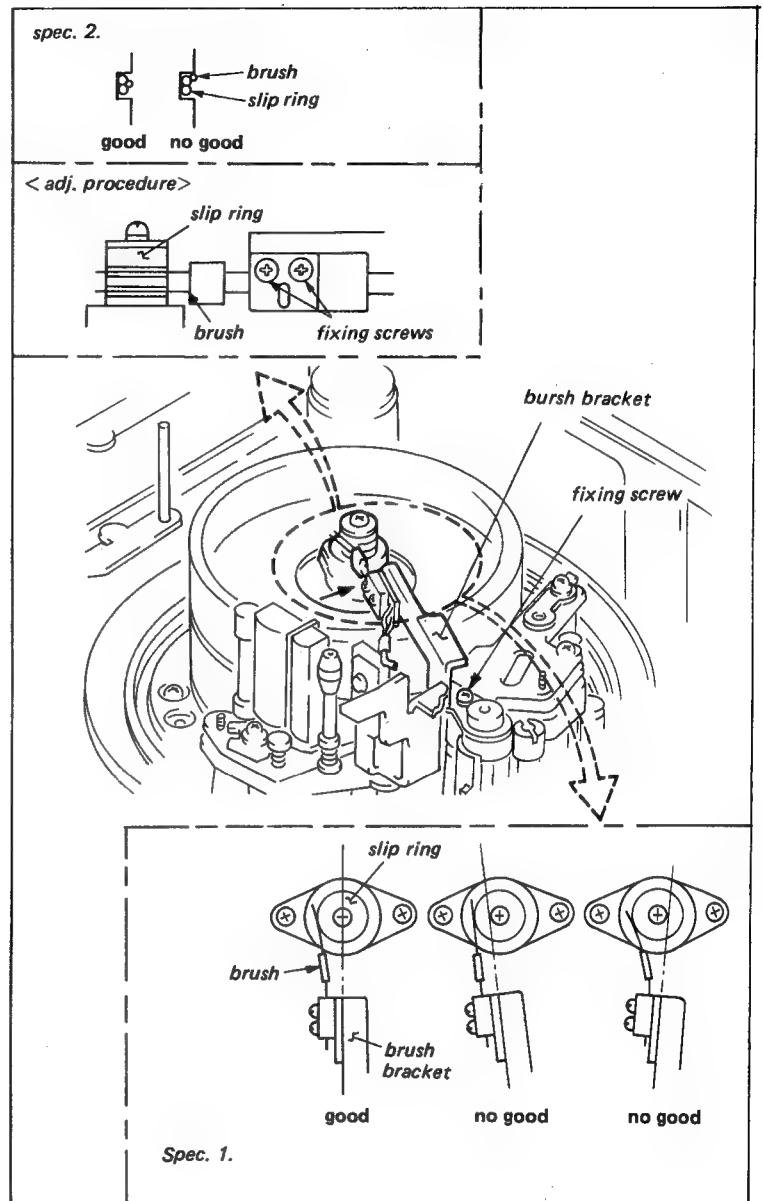
8-11. BRUSH MOUNTING POSITION ADJUSTMENT

Cassette tape : —

Mode : EJECT mode

Adjustment procedure: Spec. 1. — Adjust the position of the brush bracket.

Spec. 2. — Adjust the position of the brush.



8-12. TAPE SPEED ADJUSTMENT

Cassette tape : Monoscope segment of alignment tape
 Input signal : Ordinary video signal
 Mode : REC mode (But the alignment tape is playing back mode by using the PB check jig.)

Equipment : Alignment tape RR5-2SB PAL or Alignment tape RR5-2SB SECAM
 Alignment tape; RR5-2SB
 BVU-50 PB check jig
 Oscilloscope
 Frequency counter



Check procedure: Confirm that the tape speed is within the specification value at AUDIO CH-1 or CH-2 terminal on the jig.

- Value differs depending on a speed calibration value printed on the alignment tape label. The specified value for each calibration value is shown in Table-1.

Adjustment procedure: (i) Clean the two capstan belts and the drum belt.
 (ii) If it is still outside the specification, replace the two capstan belts and drum belt with a new one.
 (iii) If the specified value is not obtained after steps (i) and (ii), replace the midway pulley (lower).

Speed Calibration Value (%)	Tape Speed Specification (Hz)	Speed Calibration Value (%)	Tape Speed Specification (Hz)
0.00	30060 ~ 29925		
0.01	30057 ~ 29922	-0.01	30063 ~ 29928
0.02	30054 ~ 29919	-0.02	30066 ~ 29931
0.03	30051 ~ 29916	-0.03	30069 ~ 29934
0.04	30048 ~ 29913	-0.04	30072 ~ 29937
0.05	30045 ~ 29910	-0.05	30075 ~ 29940
0.06	30042 ~ 29907	-0.06	30078 ~ 29943
0.07	30039 ~ 29904	-0.07	30081 ~ 29946
0.08	30036 ~ 29901	-0.08	30084 ~ 29949
0.09	30033 ~ 29898	-0.09	30087 ~ 29952
0.10	30030 ~ 29895	-0.10	30090 ~ 29955
0.11	30027 ~ 29892	-0.11	30093 ~ 29958
0.12	30024 ~ 29889	-0.12	30096 ~ 29961
0.13	30021 ~ 29886	-0.13	30099 ~ 29964
0.14	30018 ~ 29883	-0.14	30102 ~ 29967
0.15	30015 ~ 29880	-0.15	30105 ~ 29970
0.16	30012 ~ 29877	-0.16	30108 ~ 29973
0.17	30009 ~ 29874	-0.17	30111 ~ 29976
0.18	30006 ~ 29871	-0.18	30114 ~ 29979
0.19	30003 ~ 29868	-0.19	30117 ~ 29982
0.20	30000 ~ 29865	-0.20	30120 ~ 29985

Table-1

Midway Pulley (lower)		Tape Speed	Pulley diameter
Mark	Parts No.		
A	3-662-505-01	Speed increase  Speed decrease	small  large
B	3-662-505-11		
C	3-662-505-21		
D	3-662-505-31		
E	3-662-505-41		
F	3-662-505-51		
G	3-662-505-61		
H	3-662-505-71		
J	3-662-505-81		
K	3-662-505-91		

8-13. COMPOSITE SHOOTING ADJUSTMENT

Composite shooting is performed as follow.

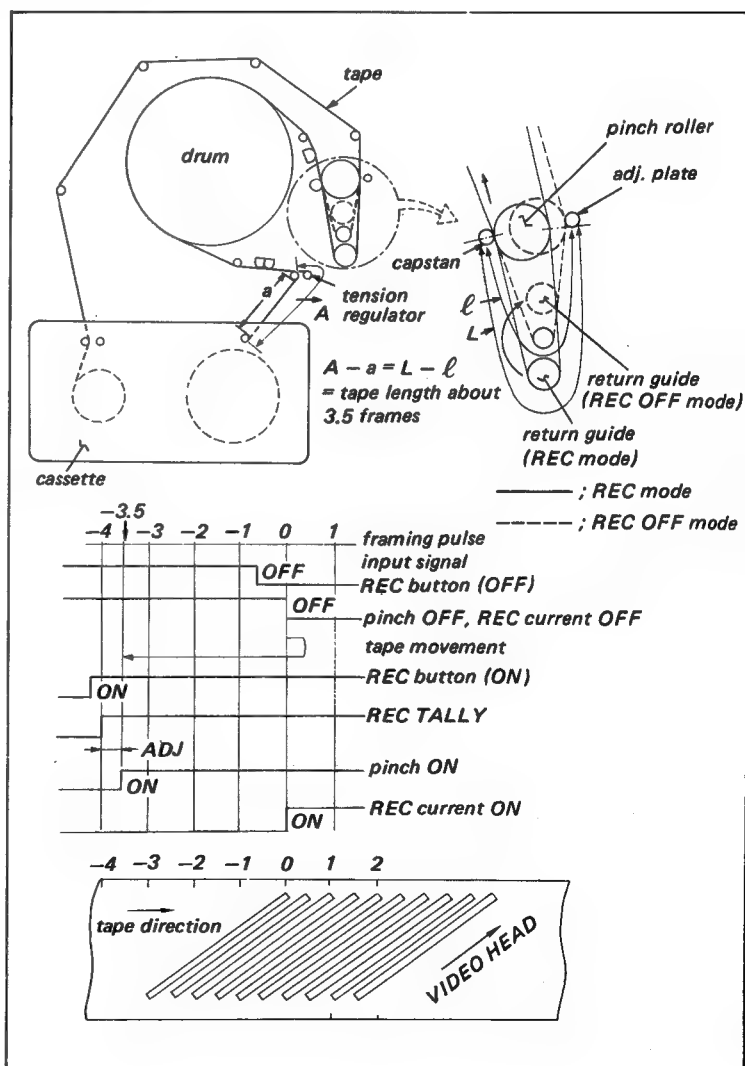
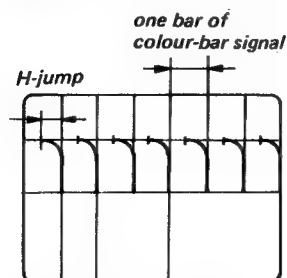
When the REC button is depressed in the REC mode, the tape is automatically backspaced for about 3.5 frames. When the REC button is depressed, the backspaced tape is moved forward without making any recording. This is sufficient to compensate for servo rise time or other transients when record is again initiated. Fig. shows how this is done mechanically. As shown in figure, the timing of the pinch roller and record current is determined by the framing pulse obtained from the video signal.

- (1) When the REC button is depressed in the REC mode, the pinch roller and the record current are turned off at the nex framing 0.
- (2) When the pinch solenoid is turned off, the pinch roller move in the direction of the arrow and is pressed against the adj. plate. The tape is caught between the pinch roller and the adj. plate, so the tape between the adj. plate and the take-up reel table cannot move.
- (3) The return guide moves as shown in the figure. This slackens tape. The excess tape is then taken up by the supply tension regulator in the right direction as shown in the figure.
- (4) When the REC button is again depressed, the REC TALLY signal is generated at “-4”, however, record is not yet set up.
- (5) The timing from REC TALLY ON to the pinch roller ON is determined by the fixed delay and variable delay (RV-1) on SS-13 board. The pinch roller is pressed against the capstan after delay, but the record does not start until the correct edit point before backspacing is reached.
- (6) Record current is automatically turned ON 4 frames after REC TALLY ON.

Cassette tape : KCS-20 cassette tape
 Input signal : Colour-bar signal
 Equipment : BVU-200P/-200S
 Colour video monitor
 Microphone
 (600Ω, with XLR connector)
 Capacitor 0.01μF

Mode : Record the colour-bar signal on the BVU-50P/-50S playback of the recorded segment on the BVU-200P/-200S.

- Check procedure:
- (i) First, position the machine horizontally. After the KCS-20 tape has run after ten minutes, repeat about five times the REC ON/OFF operation Record off should be over 1 second.
 - (ii) Position the machine vertically. Perform the same recording as above.
 - (iii) Playback the steps (i) and (ii) segments. Check that there is no loss of vertical sync, no mistracking at the REC ON/OFF point, and that the H-jump is within the two bars of the colour-bar signal.



- Adjustment procedure:
- (i) Connect the $0.01\mu\text{F}$ capacitor.
 - (ii) Put the scale shown below around RV-1 on the SS-13 board.
 - (iii) First, position the machine horizontally. Perform record ON/OFF five times. Record off should be over 1 second. During record, turn the volume in steps of 30 degrees. Use the microphone and record the position of the volume at the same time.
 - (iv) Position the machine vertically. Perform the same recording as above.
 - (v) Playback the tape in the horizontal position.
 - (vi) Find the place where the H-jump at the REC ON/OFF position is the least while watching the playback picture. (Do this independently for vertical and horizontal position.)

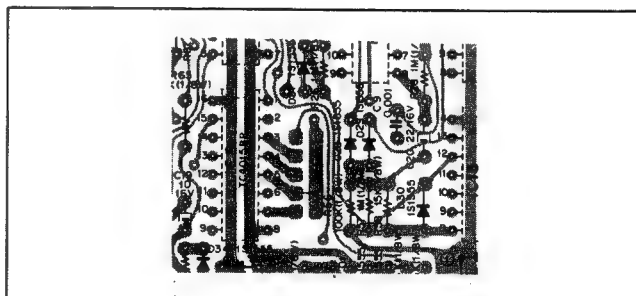
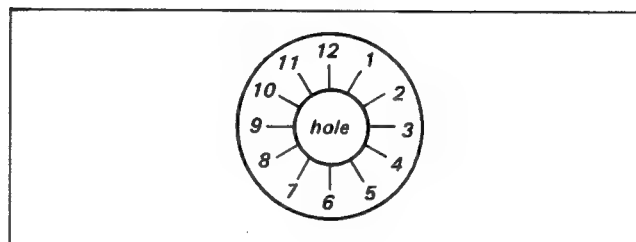
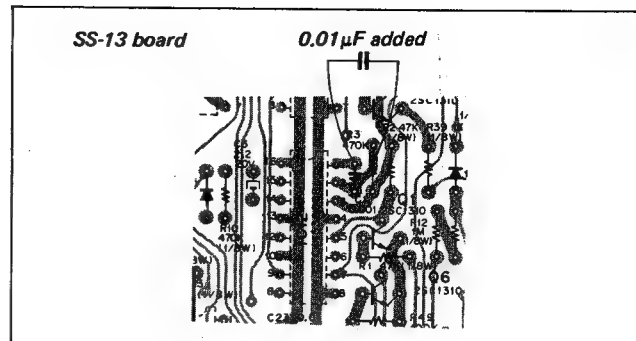
- Note:
- The more correct the backspacing becomes, the smaller the H-jump becomes.
 - If there is noticeable noise from the tracking error, the best adjustment has not yet been found, even if the H-jump is good.
 - The best points in the vertical and the horizontal positions differ about 30 degrees.

- (vii) Set RV-1 for the best point found in step (vi): to midway between the best horizontal and the vertical points.

- If the best point cannot be found only with the variable resistor, change a tap position shown below.

- (viii) Remove the capacitor attach in step (i).

- (ix) Perform the checks, following check procedure.



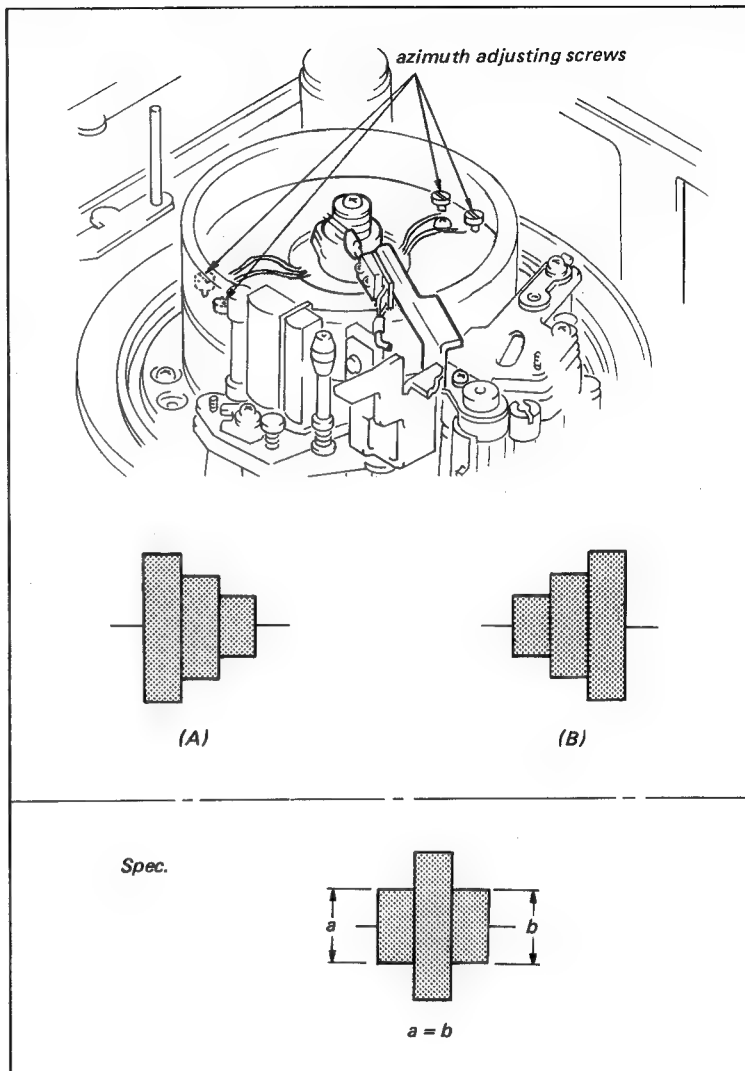
8-14. VIDEO HEAD AZIMUTH ADJUSTMENT

Video head azimuth adjustment and the video head dihedral adjustment are closely related. When this adjustment is attempted, perform the video head dihedral adjustment.

Cassette tape : Alignment tape, RF8 MHz portion.
 Input signal : Ordinary video signal
 Equipment : BVU-50PB check jig.
 Oscilloscope
 Alignment tape RR5-2SB PAL or
 Alignment tape RR5-2SB SECAM
 Mode : REC mode
 Check procedure: Confirm that the RF envelope is within the specification at VIDEO ch 1 + 2 envelope on the jig on the maximum amplitude.

- Adjustment procedure :
- (1) If the RF output signal is out of specification as shown (A).
 - (i) Put the machine into the STOP mode.
 - (ii) Locate the video head tip with white lead to the alignment tape side.
 - (iii) Turn the azimuth adjusting screw that locate the right side of the video head with white lead.
 - (2) If the RF output signal is out of specification as shown (B).
 - (i) Put the machine into the STOP mode.
 - (ii) Locate the video head tip with white lead to the alignment tape side.
 - (iii) Turn the azimuth adjusting screw that located the left side of the video head with white lead.

When this adjustment is attempted, perform the video head dihedral adjustment.



SECTION 9

POWER SUPPLY/SYSTEM CONTROL ALIGNMENT

[Equipment Required]

- DC Voltmeter
- Oscilloscope, dual trace
- Blank Tape: KCS-20 (SONY standard products)
- AC adaptor: AC-500CE
- Videocassette recorder: BVU-200P
- Alignment Tape: RR5-1SB PAL (SONY Parts No. 8-960-020-61) or RR5-2SB PAL (SONY Parts No. 8-960-020-62)

Contents

Tape Counter	Video Track	Audio Track	T/C Track
000 – 137	Colour bar (75%)	3kHz, 0dB	1 kHz
137 – 249	RF sweep	—	—
249 – 346	Monoscope	—	—
346 – 390	Modulated 20T	1kHz, 0dB	—
390 – 432	R-F 8MHz	10kHz, – 10dB	—

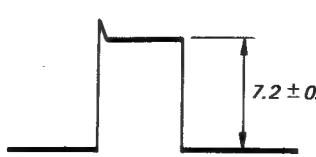
9-1. REG 12V ADJUSTMENT

machine conditions for adjustment	spec.	adjustment
<ul style="list-style-type: none"> • VIDEO IN; video signal • Record mode 	<p>TP-303/SM-19 $12.0 \pm 0.1V$</p> <p>(at TP-101/SM-19 = $12.0 \pm 0.1V$)</p>	RV1 (RV301)/SM-21

9-2. REG 9V ADJUSTMENT

machine conditions for adjustment	spec.	adjustment
<ul style="list-style-type: none"> • VIDEO IN; video signal • Record mode 	<p>TP-304/SM-19 $9.0 \pm 0.1V$</p> <p>(at TP-101/SM-19 = $12.0 \pm 0.1V$)</p>	RV2 (RV302)/SM-21

9-3. PINCH SUB DRIVE VOLTAGE ADJUSTMENT

machine conditions for adjustment	spec.	adjustment
<ul style="list-style-type: none"> • VIDEO IN; video signal • Standby mode → Record mode 	<p>TP-201/SM-19</p> <div style="text-align: center;">  <p>$7.2 \pm 0.2V$</p> </div> <p>(at TP-101/SM-19 = $12.0 \pm 0.1V$)</p>	RV1 (RV201)/SM-12

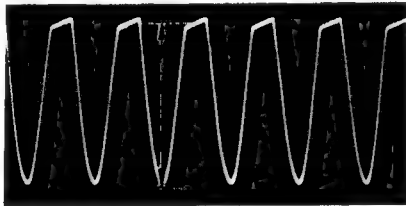
9-4. REEL MOTOR SPEED ADJUSTMENT

machine conditions for adjustment	spec.	adjustment
<ul style="list-style-type: none"> • VIDEO IN; video signal • Record mode 	TP-202/SM-19 $5.75 \pm 0.05V$	RV2 (RV202)/SM-12

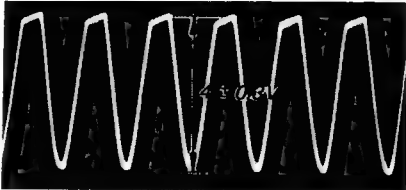

9-5. SHUT OFF VOLTAGE ADJUSTMENT

machine conditions for adjustment	spec.	adjustment
<ul style="list-style-type: none"> • VIDEO IN; video signal • Record mode 	TP-402/SM-19 $1.9V \longrightarrow 8.5V$ (at TP-101/SM-19 = $10.83 \pm 0.03V$)	RV2 (RV402)/SM-14 ↻ fully RV2/SM-14 ↻ slowly up to the point indicating 8.5V at TP-402/SM-19.

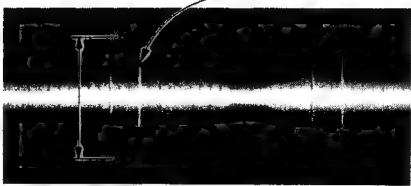

9-6. SOLAR BATTERY TUNING ADJUSTMENT

machine conditions for adjustment	spec.	adjustment
<ul style="list-style-type: none"> • VIDEO IN; video signal • Trailer tape portion 	TP-404/SM-19  Maximum amplitude	LV201/SM-19

9-7. TAPE END DET. SENSITIVITY ADJUSTMENT


machine conditions for adjustment	spec.	adjustment
<ul style="list-style-type: none"> • VIDEO IN; video signal • Trailer tape portion 	TP-404/SM-19  $\approx 0.5V$	RV1 (RV401)/SM-14
<ul style="list-style-type: none"> • VIDEO IN; video signal • Normal tape portion • Standby mode 	TP-404/SM-19  Less than 2V	

9-8. 4.8MHz TUNING ADJUSTMENT

machine conditions for adjustment	spec.	adjustment
<ul style="list-style-type: none"> • VIDEO IN; video signal • Record mode 	<p>TP-67/AR</p>  <p>Maximum amplitude</p>	<p>① T63/AR</p>
	<p>TP-61/AR</p>  <p>Maximum amplitude</p>	<p>① T62/AR</p> <p>EXT. TRIG; TP-64/AR</p>

9-9. TIME CODE REC CURRENT ADJUSTMENT

Note: Use for this adjustment "BVU-200P".

machine conditions for adjustment	spec.	adjustment
<ul style="list-style-type: none"> • VIDEO IN; video signal • TIME CODE IN (CN5-PIN3); 1 kHz, 0 dB, rectangle-wave (sine-wave) • Record mode 	<p>TP-42/AR</p> 	<p>Temporarily set the</p> <p>① RV41/AR</p> <p>$A = 25^{+3}_{-5} \text{ mV}$</p> <p>Repeat the adjustment until spec is met.</p>
<ul style="list-style-type: none"> • Playback mode 	<p>TP-8/TC-3 (BVU-200P)</p> <p>Alignment tape PB level = B</p> <p>Recorded by the BVU-50P portion PB level = C</p> <p>$C = B \pm 1.5\text{dB}$</p>	<p>(TIME CODE PB AMP OUT)</p>

9-10. COMPOSITE SHOOTING ADJUSTMENT

Refer to the sec. 8-13.

SECTION 10

SERVO SYSTEM ALIGNMENT

[Equipment Required]

- Oscilloscope, dual trace
- Blank Tape: KCS-20 (SONY standard products)
- AC adaptor: AC-500CE
- Videocassette recorder: BVU-200P

10-1. DRUM FREE SPEED ADJUSTMENT

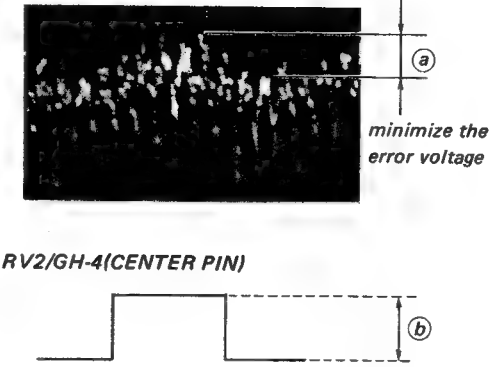
machine conditions for adjustment	spec.	adjustment
<ul style="list-style-type: none"> • VIDEO IN; video signal • Record mode 		<p>RV101/SS-13</p> <p>EXT. TRIG: TP-106/SS-13</p>

10-2. DRUM LOCK PHASE ADJUSTMENT

Note: Use for this adjustment "BVU-200P".

machine conditions for adjustment	spec.	adjustment
<ul style="list-style-type: none"> • VIDEO IN; video signal • Record mode 		<p>Temporarily set the RV102/SS-13</p> <p>$A = 13H$</p> <p>If spec. is not met, adjust as follow.</p> <p>RV102/SS-13</p> <p>$A = 13 - (B - 2.5H)$</p> <p>EXT. TRIG: TP-106/SS-13</p>
<ul style="list-style-type: none"> • Playback mode (Recorded by the BVU-50) 	<p>$B = 2.5 \pm 0.5 H$</p>	<p>(PB SYNC SEP OUT)</p> <p>(RF SW PULSE)</p>

10-3. PICTURE SPLITTING COMPENSATOR ADJUSTMENT

machine conditions for adjustment	spec.	adjustment
<ul style="list-style-type: none"> • REC mode 	<p>TP10/SS-13</p>  <p>RV2/GH-4(CENTER PIN)</p>	<ul style="list-style-type: none"> ● Step 1. RV2/GH-4: Minimize (b) 2. RV1/GH-4: Equalize the phase 3. RV2/GH-4: Minimize (a) <p>TRIG: TP6/SS-13</p>

SECTION 11

AUDIO SYSTEM ALIGNMENT

[Equipment Required]

- Alignment Tape: RR5-1SB PAL (SONY Parts No. 8-960-020-61) or RR5-2SB PAL (SONY Parts No. 8-960-020-62)

Contents

Tape Counter	Video Track	Audio Track	T/C Track
000 – 137	Colour bar (75%)	3kHz, 0dB	1kHz
137 – 249	RF sweep	—	—
249 – 346	Monoscope	—	—
346 – 390	Modulated 20T	1kHz, 0dB	—
390 – 432	R-F 8MHz	10kHz, – 10dB	—

- Blank Tape: KCS-20 (SONY standard products)
- Audio Oscillator
- Audio Attenuator
- VTVM
- Oscilloscope, dual trace
- Frequency Counter
- Videocassette recorder: BVU-200P
- AC adaptor: AC-500CE

[Cleaning]

Clean the head, drum, and tape paths such as tape guides with a chamois dampened with methanol.

[Head degaussing]

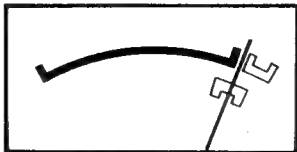
Demagnetize the heads with the head demagnetizer.

11-1. "AUDIO LEVEL" CONTROL SETTING


machine conditions for adjustment	spec.	adjustment
<ul style="list-style-type: none"> ● AUDIO SW; MANUAL ● MIC SELECT SW; CH-2/R ● MIC IN; 1kHz, –60dB ● Standby mode 	TP-12/AR (CH-1) –7 ± 0.3dB TP-22/AR (CH-2) –7 ± 0.3dB	<ul style="list-style-type: none"> ● AUDIO LEVEL (CH-1) ● AUDIO LEVEL (CH-2)

Note: The AUDIO LEVEL control should not be touched until rest of sec. 11 AUDIO SYSTEM Alignment are completed.

11-2. METER CALIBRATION (CH-2 AUDIO)

machine conditions for adjustment	spec.	adjustment
<ul style="list-style-type: none"> ● AUDIO SW; MANUAL ● MIC SELECT SW; CH-2/R ● METER SELECT SW; CH-2 ● MIC IN; 1kHz, –60dB ● Standby mode 		<ul style="list-style-type: none"> ● RV2/EA-1 (CH-2)

11-3. METER CALIBRATION (CH-1 AUDIO)

machine conditions for adjustment	spec.	adjustment
<ul style="list-style-type: none"> • AUDIO SW; MANUAL • METER SELECT SW; CH-1 • MIC IN; 1kHz, -60dB • Standby mode 		<ul style="list-style-type: none"> • RV1/EA-1 (CH-1)

11-4. LIMITER LEVEL ADJUSTMENT

machine conditions for adjustment	spec.	adjustment
<ul style="list-style-type: none"> • AUDIO SW; MANUAL • MIC SELECT SW; CH-2/R • MIC IN; 1kHz, -30dB • Standby mode 	TP-12/AR (CH-1) $3 \pm 0.5dB$ TP-22/AR (CH-2) $3 \pm 0.5dB$	<ul style="list-style-type: none"> • RV101/AR (CH-1) • RV201/AR (CH-2)

11-5. BIAS TRAP ADJUSTMENT

machine conditions for adjustment	spec.	adjustment
<ul style="list-style-type: none"> • MIC SELECT SW; CH-2/R • MIC IN; no signal • VIDEO IN; video signal • Record mode 	TP-13/AR (CH-1) TP-23/AR (CH-2) Adjust for minimum level (less than -4 dB)	<ul style="list-style-type: none"> • L102/AR (CH-1) • L202/AR (CH-2)

11-6. OVERALL FREQUENCY ADJUSTMENT

Note: Use for this adjustment "BVU-200P".

machine conditions for adjustment	spec.	adjustment
<ul style="list-style-type: none"> • Playback mode; RR5-1SB PAL (1kHz/10kHz segment) 	LINE OUT (terminated)/BVU-200P $\left[\begin{matrix} 1kHz \\ PB \text{ level} \end{matrix} \right] - \left[\begin{matrix} 10kHz \\ PB \text{ level} \end{matrix} \right] = A1 \text{ (CH-1)}$ $\left[\begin{matrix} 1kHz \\ PB \text{ level} \end{matrix} \right] - \left[\begin{matrix} 10kHz \\ PB \text{ level} \end{matrix} \right] = A2 \text{ (CH-2)}$	<ul style="list-style-type: none"> • RV103/AR (CH-1) • RV203/AR (CH-2)
<ul style="list-style-type: none"> • AUDIO SW; MANUAL • MIC SELECT SW; CH-2/R • MIC IN; 1kHz, -60dB 10kHz, -70dB • VIDEO IN; video signal • Record mode 		
<ul style="list-style-type: none"> • Playback mode; (Recorded by the BVU-50P) 	LINE OUT (terminated)/BVU-200P $\left[\begin{matrix} 1kHz \\ PB \text{ level} \end{matrix} \right] - \left[\begin{matrix} 10kHz \\ PB \text{ level} \end{matrix} \right] = B1 \text{ (CH-1)}$ $\left[\begin{matrix} 1kHz \\ PB \text{ level} \end{matrix} \right] - \left[\begin{matrix} 10kHz \\ PB \text{ level} \end{matrix} \right] = B2 \text{ (CH-2)}$ $B1 = A1 \pm 1.0dB$ $B2 = A2 \pm 1.0dB$	

11-7. RECORD LEVEL ADJUSTMENT

Note: Use for this adjustment "BVU-200P".

machine conditions for adjustment	spec.	adjustment
<ul style="list-style-type: none"> • Playback mode; RR5-1SB PAL (1kHz segment) 	<p><i>LINE OUT (terminated)/BVU-200P</i></p> <p>1kHz PB level = A1 (CH-1) 1kHz PB level = A2 (CH-2)</p>	<p>RV102/AR (CH-1) RV202/AR (CH-2)</p>
<ul style="list-style-type: none"> • AUDIO SW; MANUAL • MIC SELECT SW; CH-2/R • MIC IN; 1kHz, -60dB • VIDEO IN; video signal • Record mode 		
<ul style="list-style-type: none"> • Playback mode; (Recorded by the BVU-50P) 	<p><i>LINE OUT (terminated)/BVU-200P</i></p> <p>1kHz PB level = B1 (CH-1) 1kHz PB level = B2 (CH-2)</p> <p>$B1 = A1 \pm 1.0\text{dB}$ $B2 = A2 \pm 1.0\text{dB}$ (The level difference between CH-1 & CH-2 should be less than 1dB.)</p>	

SECTION 12

VIDEO SYSTEM ALIGNMENT

[Equipment Required]

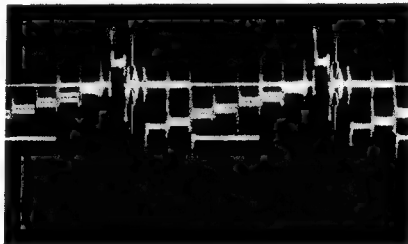
- Alignment Tape: RR5-1SB PAL (SONY Parts No. 8-960-020-61) or RR5-2SB PAL (SONY Parts No. 8-960-020-62)

Contents

Tape Counter	Video Track	Audio Track	T/C Track
000 – 137	Colour bar (75%)	3kHz, 0dB	1kHz
137 – 249	RF sweep	–	–
249 – 346	Monoscope	–	–
346 – 390	Modulated 20T	1kHz, 0dB	–
390 – 432	R-F 8MHz	10kHz, – 10dB	–

- Blank Tape; KCS-20 (SONY standard products)
- Oscilloscope, dual trace
- Frequency Counter
- Videocassette recorder; BVU-200P
- AC adaptor; AC-500CE
- Video sweep generator
- Sin² wave signal generator
- Vectorscope


12-1. COLOUR Y-4.43 MHz TRAP ADJUSTMENT

machine conditions for adjustment	spec.	adjustment
<ul style="list-style-type: none"> VIDEO IN; colour video signal Short TP-6 ↔ TP-7/SM-19 with jumper Short both ends of FL1/SM-19 with jumper Standby mode 	<p>TP-5/SM-19</p>  <p>Minimum amplitude</p>	<p>⦿ LV1/SM-19</p> <p>EXT. TRIG; TP-3/SM-19</p>

12-2. SYNC TIP CARRIER FREQUENCY ADJUSTMENT

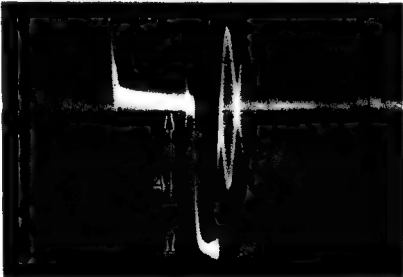
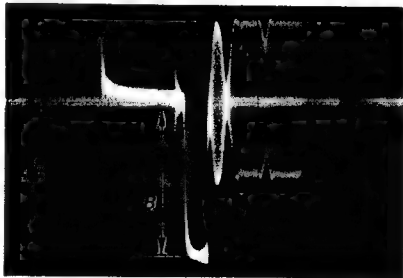
machine conditions for adjustment	spec.	adjustment
<ul style="list-style-type: none"> VIDEO IN; no signal Short TP-405 ↔ GND/SM-19 with jumper Standby mode 	<p>TP-9/SM-19</p> <p>4.80 ± 0.05MHz</p>	<p>⦿ RV4/SM-19</p>

12.3. Y-FM MODULATOR BALANCE ADJUSTMENT

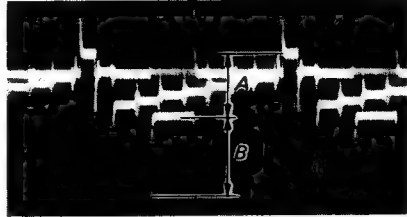
machine conditions for adjustment	spec.	adjustment
<ul style="list-style-type: none"> • VIDEO IN; no signal • Short TP-405 \longleftrightarrow GND/SM-19 with jumper • Standby mode 	<p>TP-9/SM-19 ; scope CH-A } ALT TP-9/SM-19 [INVERT] ; scope CH-B } mode</p>  <p>T = 0</p>	<p>RV3/SM-19</p>

12.4. Y-FM DEVIATION ADJUSTMENT

Note: Use for this adjustment "BVU-200P".

machine conditions for adjustment	spec.	adjustment
<ul style="list-style-type: none"> • Playback mode; RR5-1SB PAL (colour bar segment) 	<p>VIDEO OUT (terminated)/BVU-200P</p> 	
<ul style="list-style-type: none"> • Playback mode; (Recorded a colour video signal on BVU-50P) 	<p>VIDEO OUT (terminated)/BVU-200P</p>  <p>$A = B \pm 0.01V$</p>	<p>RV1/SM-19</p> <p>A > B adjust RV1 ⤴</p> <p>A < B adjust RV1 ⤵</p>

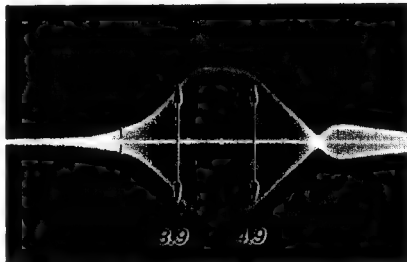
12-5. WHITE CLIP ADJUSTMENT

machine conditions for adjustment	spec.	adjustment
<ul style="list-style-type: none"> • VIDEO IN; 75% colour bar or any signal that has definite 100% white peak level • Standby mode 	<p>TP-5/SM-19</p>  $\frac{A}{B} = \frac{5}{6^{+0}_{-0.1}}$	<p>RV2/SM-19</p> <p>EXT. TRIG: TP-3/SM-19</p>

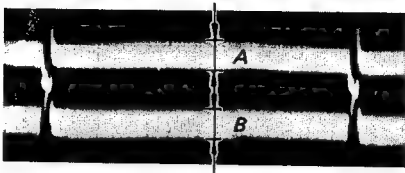
12-6. 5.36 MHz OSCILLATOR FREQUENCY ADJUSTMENT

machine conditions for adjustment	spec.	adjustment
<ul style="list-style-type: none"> • VIDEO IN; video signal • Standby mode 	<p>TP-20/SM-19</p> <p>5,357,429 ± 5Hz</p>	<p>CV1/SM-19</p>

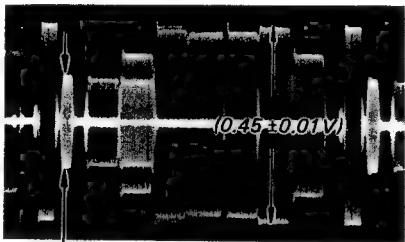
12-7. CHROMA FREQUENCY RESPONSE ADJUSTMENT

machine conditions for adjustment	spec.	adjustment
<ul style="list-style-type: none"> • VIDEO IN; gated sweep signal • Standby mode 	<p>TP-16/SM-19</p>  <p>3.9 MHz amplitude = 4.9 MHz amplitude</p>	<p>T1/SM-19</p> <p>EXT. TRIG: TP-106/SS-13</p>

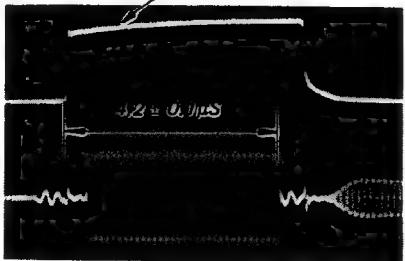
12-8. APC SETTING ADJUSTMENT

machine conditions for adjustment	spec.	adjustment
<ul style="list-style-type: none"> • VIDEO IN; colour video signal • Standby mode 	<p>TP-19/SM-19</p>  <p>A = B</p>	<p>⊗ T5/SM-19</p> <p>EXT. TRIG: TP-106/SS-13</p>

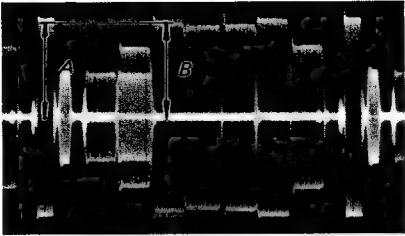
12-9. ACC LEVEL ADJUSTMENT

machine conditions for adjustment	spec.	adjustment
<ul style="list-style-type: none"> • VIDEO IN; colour video signal • Standby mode 	<p>TP-17/SM-19</p>  <p>(0.45 ± 0.01 V)</p> <p>0.19 ± 0.01 V</p>	<p>⊗ RV10/SM-19</p> <p>EXT. TRIG: TP-3/SM-19</p>

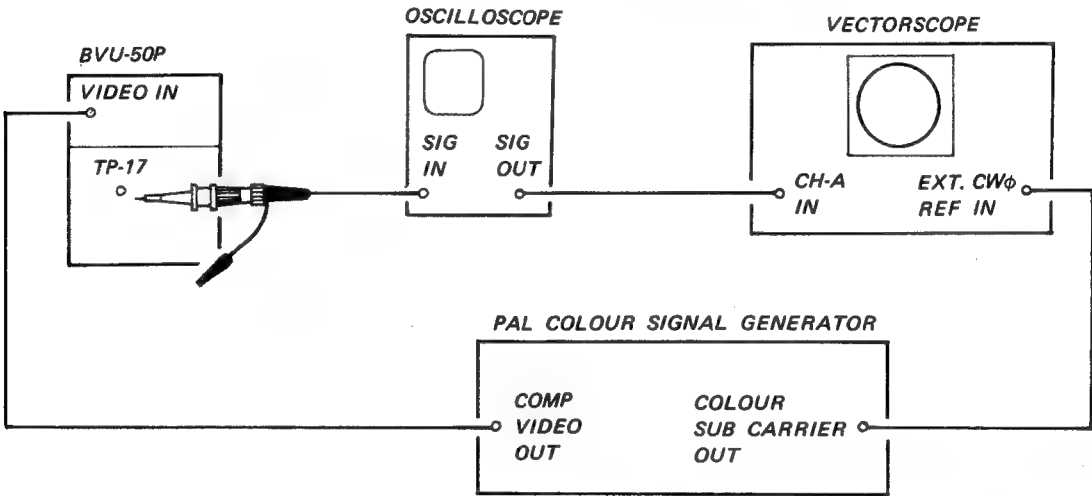
12-10. PILOT BURST WIDTH ADJUSTMENT


machine conditions for adjustment	spec.	adjustment
<ul style="list-style-type: none"> • VIDEO IN; colour video signal • Standby mode 	<p>TP-3/SM-19</p> <p>TP-17/SM-19</p>  <p>H sync</p> <p>4.2 ± 0.1 μs</p>	<p>⊗ RV5/SM-19</p> <p>EXT. TRIG: TP-3/SM-19</p>

12-11. PILOT BURST LEVEL ADJUSTMENT


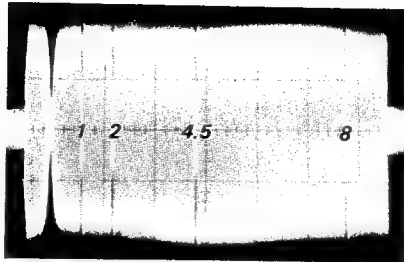
machine conditions for adjustment	spec.	adjustment
<ul style="list-style-type: none">VIDEO IN; colour bar signalStandby mode	<div>TP-18/SM-19</div>  <div>A = B</div>	<div>RV11/SM-19</div> <div>EXT. TRIG; TP-3/SM-19</div>

12-12. PILOT BURST PHASE ADJUSTMENT




machine conditions for adjustment	spec. & adjustment
<ul style="list-style-type: none">VIDEO IN; colour video signalStandby mode	<div>TP-17/SM-19</div> <div>To the U-axis with $\pm 5^\circ$</div> <div>LV2/SM-19</div> <div>PILOT BURST SIGNAL</div> 

12-13. Y-RECORD CURRENT FREQUENCY RESPONSE ADJUSTMENT

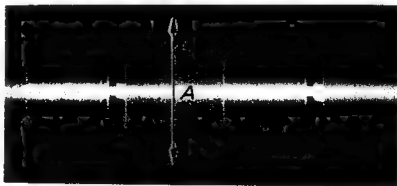
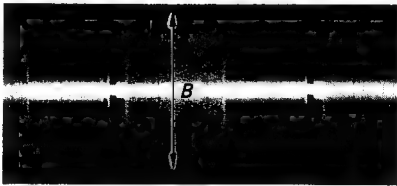
machine conditions for adjustment	spec.	adjustment								
<ul style="list-style-type: none">• VIDEO IN; B/W video signal• Short TP-9↔E3/SM-19 with jumper• Feed a sweep signal at TP-10/SM-19 (GND: E3)  <p>1 4.5MHz</p> <ul style="list-style-type: none">• Record mode	<p>TP-12/SM-19 (CH-A) TP-14/SM-19 (CH-B)</p>  <table><tr><th>1MHz</th><th>2MHz</th><th>4.5MHz</th><th>8MHz</th></tr><tr><td>100% refer</td><td>100⁺⁰₋₅ %</td><td>100⁺⁰₋₅ %</td><td>90 ± 10%</td></tr></table>	1MHz	2MHz	4.5MHz	8MHz	100% refer	100 ⁺⁰ ₋₅ %	100 ⁺⁰ ₋₅ %	90 ± 10%	<ul style="list-style-type: none">⌚ RV8/SM-19 (CH-A)⌚ RV9/SM-19 (CH-B)
1MHz	2MHz	4.5MHz	8MHz							
100% refer	100 ⁺⁰ ₋₅ %	100 ⁺⁰ ₋₅ %	90 ± 10%							

12-14. Y-RECORD CURRENT LEVEL ADJUSTMENT

machine conditions for adjustment	spec.	adjustment
<ul style="list-style-type: none"> • VIDEO IN; colour video signal • Short TP-18 ↔ E5/SM-19 with jumper • Record mode 	<p>TP-12, 14 /SM-19</p>  <p>SYNC level 0.35 ± 0.05V</p>	<ul style="list-style-type: none"> ⌚ RV6/SM-19 <p>EXT. TRIG: TP-3/SM-20</p>

12-15. CHROMA RECORD CURRENT LEVEL ADJUSTMENT

Note: Use for this adjustment "BVU-200P".

machine conditions for adjustment	spec.	adjustment
<ul style="list-style-type: none"> • Playback mode; RR5-1SB PAL (colour bar segment) 	<p>TP-101/DM-9P (BVU-200P)</p> 	<p>(PB ACC IN)</p>
<ul style="list-style-type: none"> • Playback mode (Recorded a colour bar signal on BVU-50P) • TRACKING VR; Set the "B" amplitude is maximum. 	<p>TP-101/DM-9P (BVU-200P)</p>  <p>A = B ± 0.035V</p>	<ul style="list-style-type: none"> ⌚ RV7/SM-19 <p>A > B adjust RV7 ⌚</p> <p>A < B adjust RV7 ⌚</p>


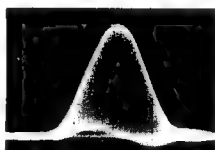
12-16. Y/C DELAY DIFFERENCE ADJUSTMENT

The C5 or C6 are provided in BVU-50P for Y/C delay adjustment, however the variation is very small, and usually no adjustment is necessary.

When replacing the C5 or C6 only solder the necessary tap.

However, in case delay time adjustment of the playback Y signal is necessary adjust as follows.

Note: Use for this adjustment "BVU-200P".

machine conditions for adjustment	spec.	adjustment
<ul style="list-style-type: none"> • Playback mode; (Recorded a modulated 20 T pulse on BVU-50P) 	<p>VIDEO OUT (BVU-200P) waveform of modulated 20T pulse segment</p> <div style="display: flex; justify-content: space-around; align-items: center;">   </div> <div style="display: flex; justify-content: space-around; align-items: center;"> <p>(GOOD)</p> <p>(NG)</p> </div>	<ul style="list-style-type: none"> ● Select the tap C5 or C6 /SM-19

SECTION 13

SPARE PARTS AND TOOL

13-1. PARTS INFORMATION

1. Safety Related Component Warning

Components identified by shading on the schematic diagrams, exploded views and electrical spare parts list are critical to safe operation. Replace these components with Sony parts whose part numbers appear as shown in this manual or in service bulletins and service manual supplements published by Sony.

2. Replace Parts that are supplied from Sony Parts Center can sometimes have different shape and external appearance than what are actually used in equipment. This is due to "accomodating the improved parts and/or engineering changes" or "standardization of genuine parts".

- This manual's exploded views and electrical spare parts lists are indicating the parts numbers of "the standardized genuine parts at present".
- Regarding engineering parts changes in our engineering department, refer Sony service bulletins and service manual supplements.

3. Printed Components in Bold-Face type on the exploded views and electrical spare parts list are normally stocked for replacement purposes. The remaining parts are not normally required for routine service work. Orders for parts not shown in Bold-Face type will be processed, but allow for additional delivery time.

4. Item with no part number and/or no description are not stocked because they are seldom required for routine service.

5. (T) after a spring description is shown on the exploded views in order to indicate the number of a spring turn required for the use.

(Example) Spring, tension (24T); This spring must be cut at its 24th turn for actual use.

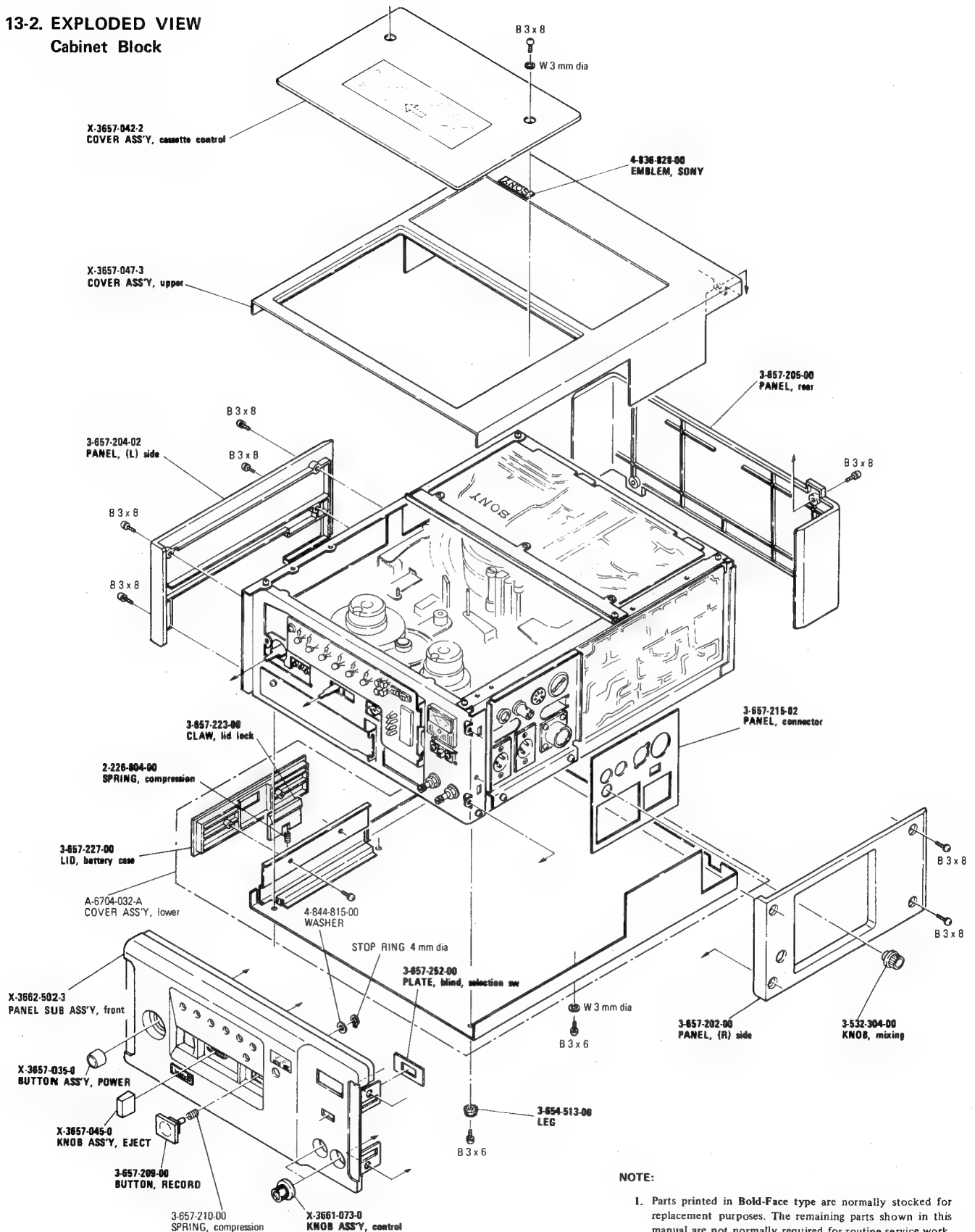
6. Screws

- All the screws used in this machine are the TOTSU type unless otherwise noted. The screws are interchangeable with the Phillips type (⊕) and slotted type (⊖) screws.
- Please order as the following part number when ordering the TOTSU type screws.



Size	PS	PSW	B (BZnN)	B (Cr-N)	PTT	PTTWH
2.6 x 4	7-621-972-05	_____	7-621-912-10	7-621-912-18	_____	_____
2.6 x 6	7-621-972-25	_____	7-621-912-30	7-621-912-38	_____	_____
2.6 x 8	7-621-972-35	_____	7-621-912-40	7-621-912-48	_____	_____
2.6 x 10	7-621-972-45	_____	7-621-912-50	7-621-912-58	_____	_____
2.6 x 12	7-621-972-55	_____	7-621-912-60	7-621-912-68	_____	_____
3 x 6	7-686-447-01	7-686-527-01	7-686-624-09	7-686-624-04	7-687-411-31	7-687-510-31
3 x 8	7-686-448-01	7-686-528-01	7-686-625-09	7-686-625-04	7-687-412-31	7-687-511-31
3 x 10	7-686-449-01	7-686-529-01	7-686-626-09	7-686-626-04	7-687-413-31	7-687-512-31
3 x 12	7-686-450-01	7-686-530-01	7-686-627-09	7-686-627-04	_____	_____
3 x 16	7-686-452-01	7-686-532-01	7-686-629-09	7-686-629-04	_____	_____
3 x 25	7-686-454-01	7-686-534-01	7-686-631-09	7-686-631-04	_____	_____
4 x 8	7-686-468-01	_____	_____	7-686-635-04	_____	_____
4 x 12	7-686-470-01	_____	_____	7-686-637-04	_____	_____
4 x 14	7-686-471-01	_____	_____	7-686-638-04	_____	_____
4 x 16	7-686-472-01	_____	_____	7-686-639-04	_____	_____
4 x 20	7-686-473-01	_____	_____	7-686-640-04	_____	_____

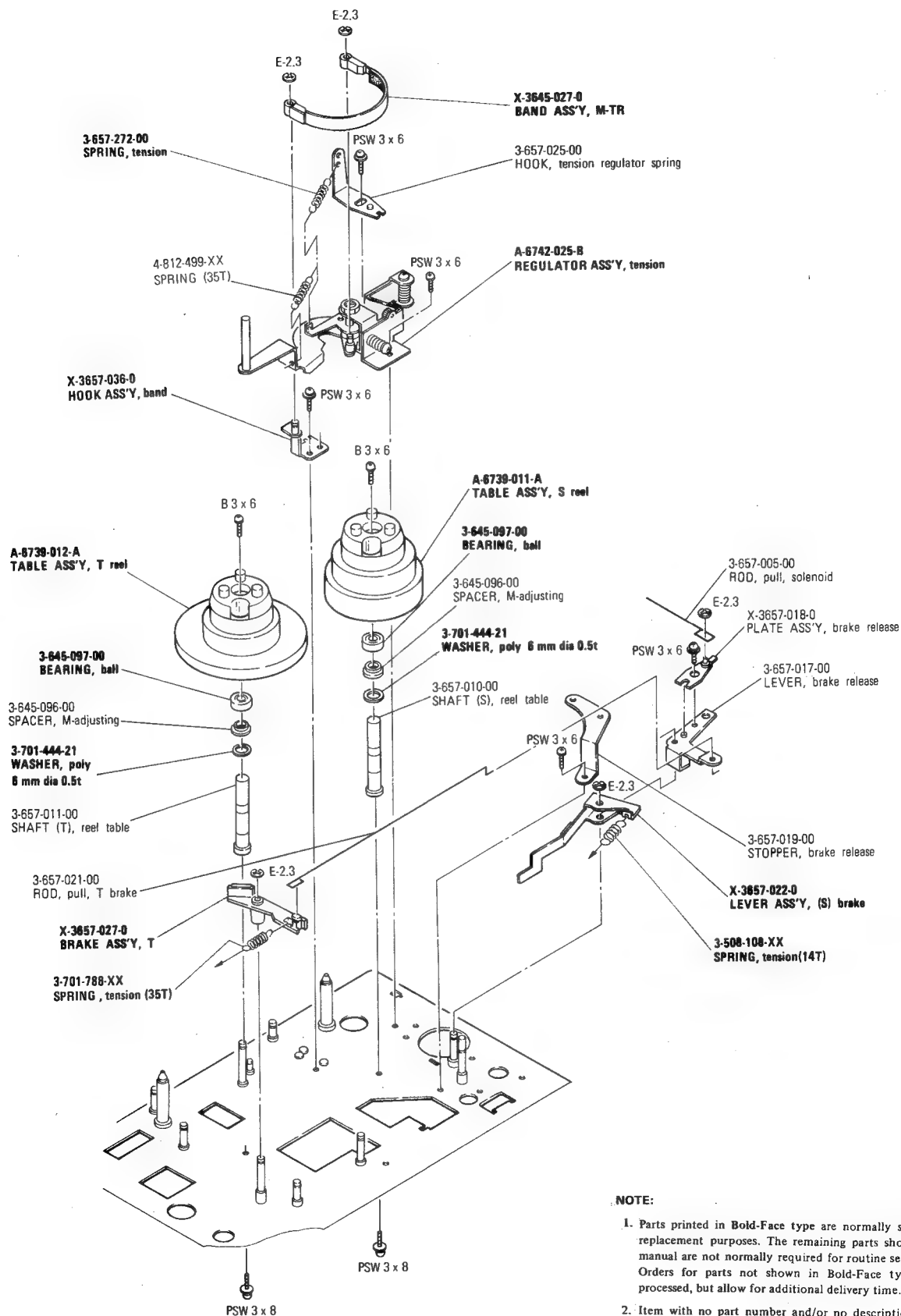
13-2. EXPLODED VIEW Cabinet Block



NOTE:

1. Parts printed in **Bold-Face** type are normally stocked for replacement purposes. The remaining parts shown in this manual are not normally required for routine service work. Orders for parts not shown in **Bold-Face** type will be processed, but allow for additional delivery time.
2. Item with no part number and/or no description are not stocked because they are seldom required for routine service.

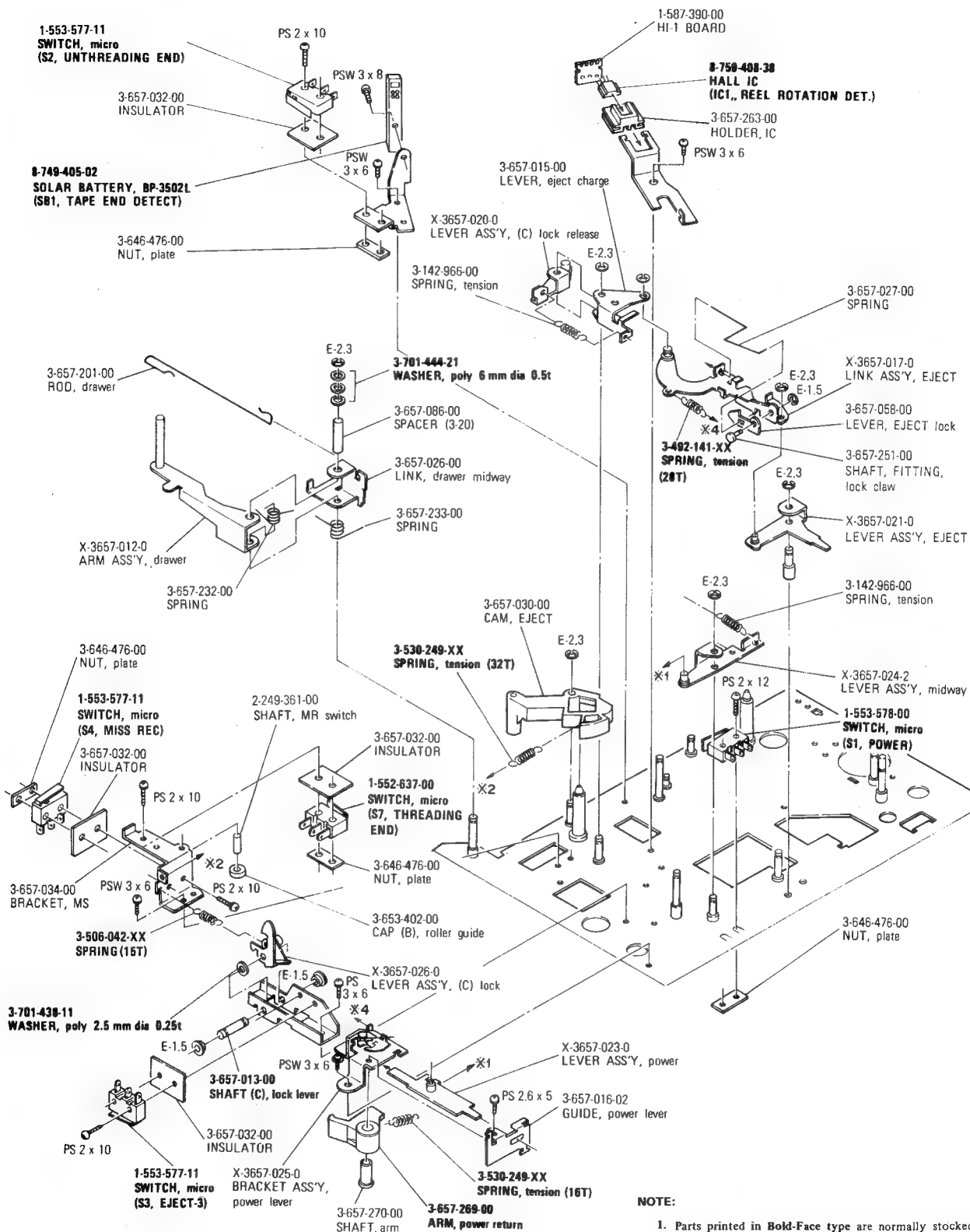
Link Block (1) reel table and brake system



NOTE:

1. Parts printed in **Bold-Face** type are normally stocked for replacement purposes. The remaining parts shown in this manual are not normally required for routine service work. Orders for parts not shown in **Bold-Face** type will be processed, but allow for additional delivery time.
2. Item with no part number and/or no description are not stocked because they are seldom required for routine service.

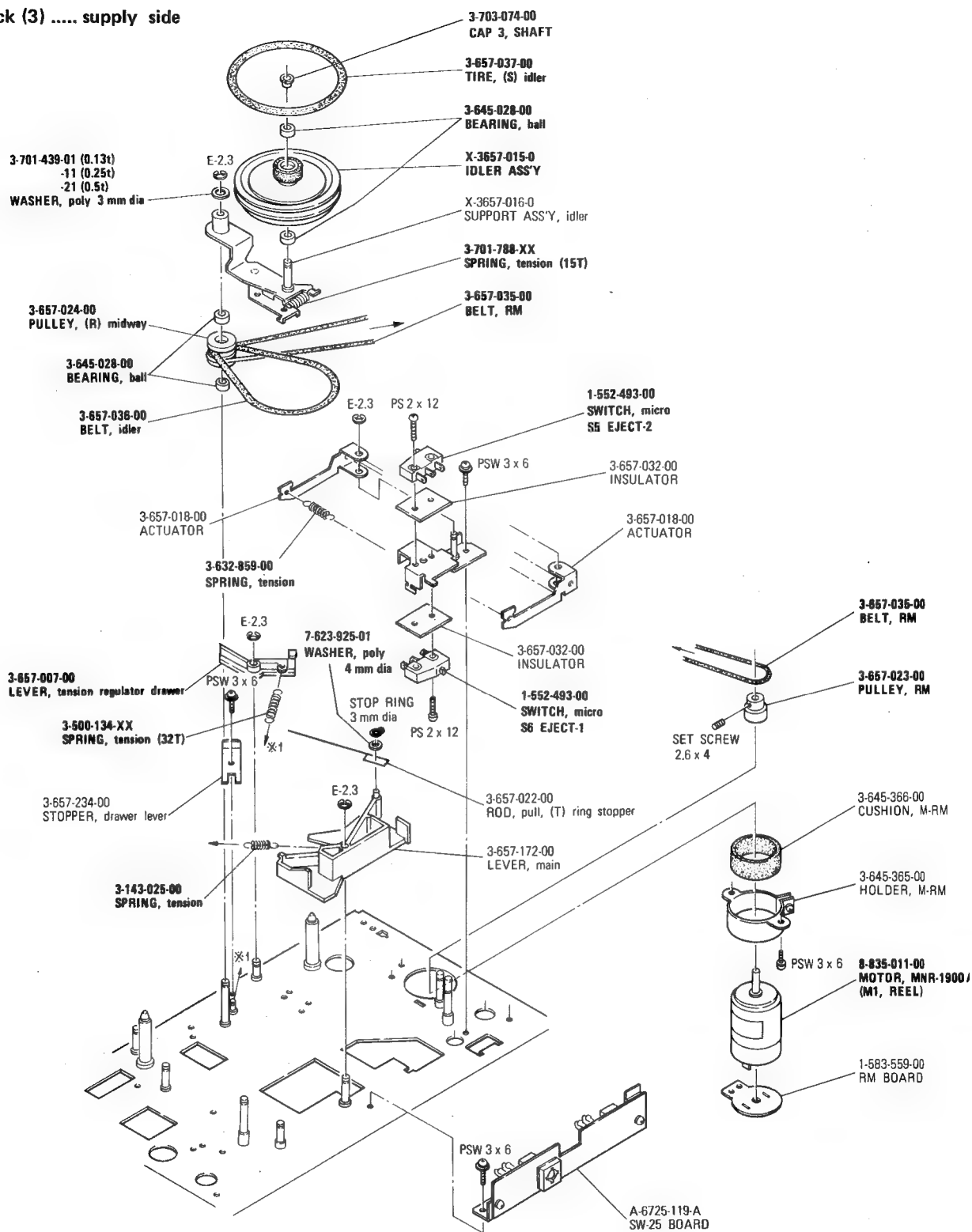
Link Block (2) take-up side



NOTE:

1. Parts printed in **Bold-Face type** are normally stocked for replacement purposes. The remaining parts shown in this manual are not normally required for routine service work. Orders for parts not shown in **Bold-Face type** will be processed, but allow for additional delivery time.
2. Item with no part number and/or no description are not stocked because they are seldom required for routine service.

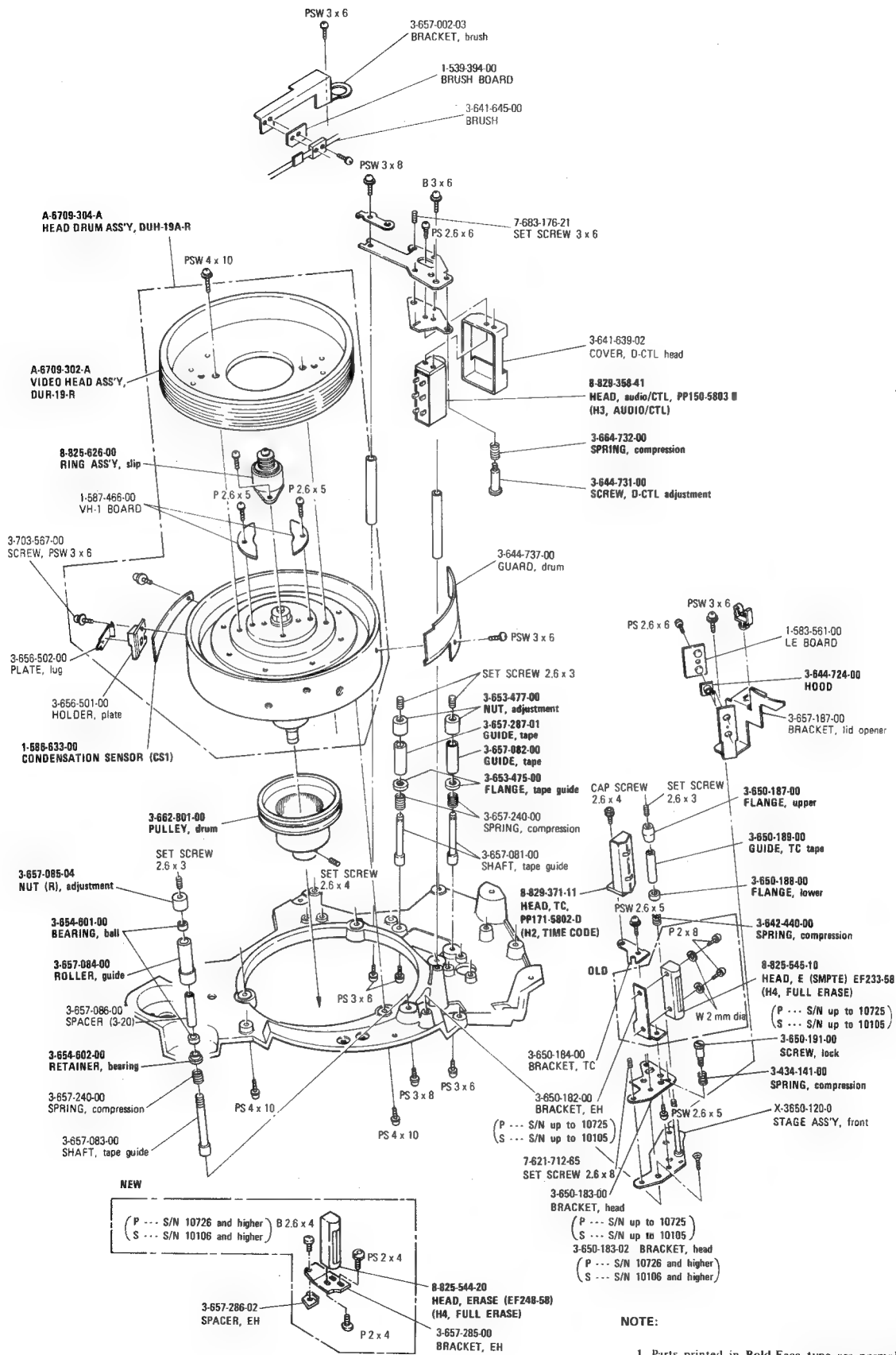
Link Block (3), supply side



NOTE:

1. Parts printed in **Bold-Face type** are normally stocked for replacement purposes. The remaining parts shown in this manual are not normally required for routine service work. Orders for parts not shown in **Bold-Face type** will be processed, but allow for additional delivery time.
2. Item with no part number and/or no description are not stocked because they are seldom required for routine service.

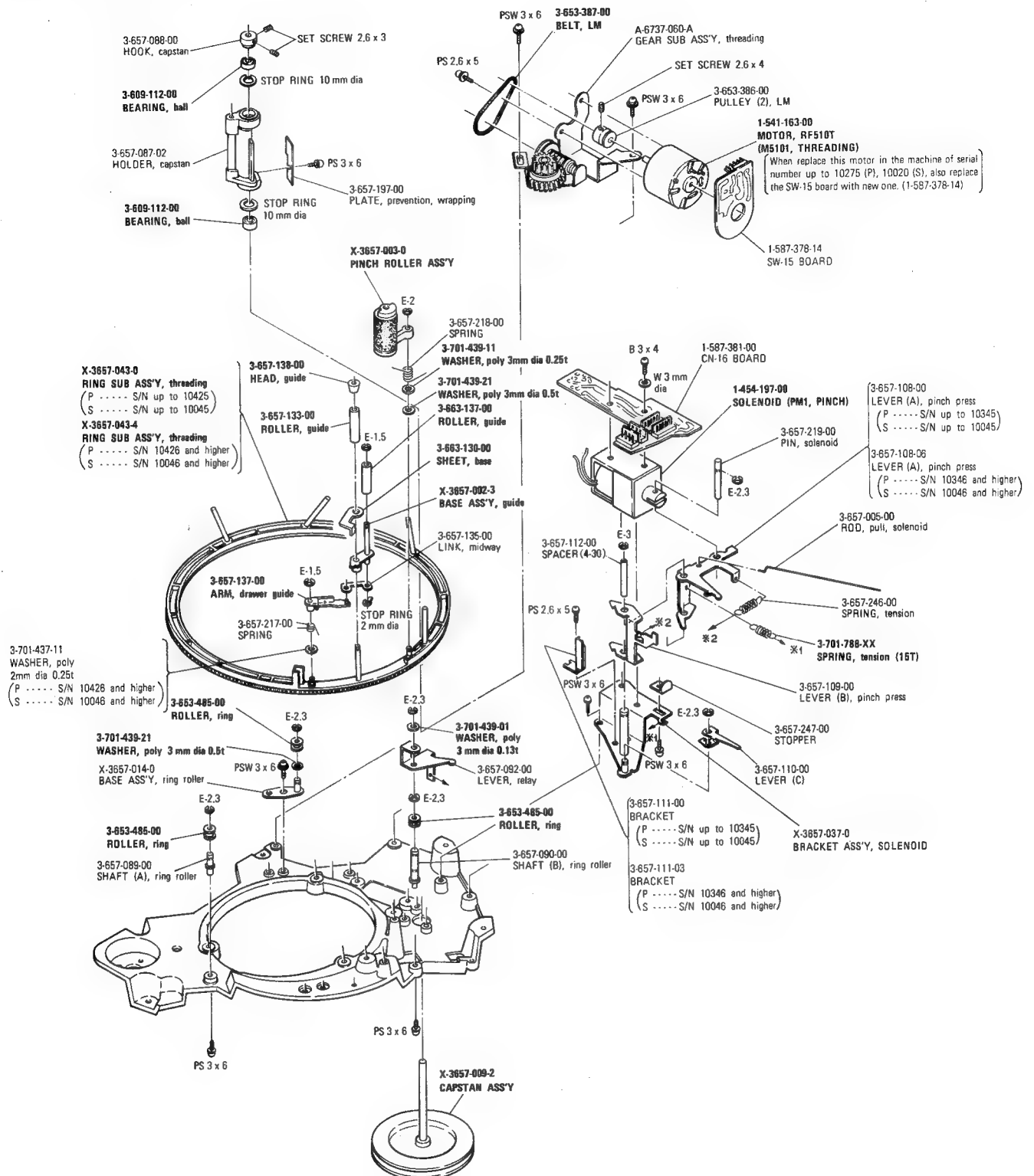
Head Drum and Tape Guides Block



NOTE:

1. Parts printed in **Bold-Face type** are normally stocked for replacement purposes. The remaining parts shown in this manual are not normally required for routine service work. Orders for parts not shown in **Bold-Face type** will be processed, but allow for additional delivery time.
2. Item with no part number and/or no description are not stocked because they are seldom required for routine service.

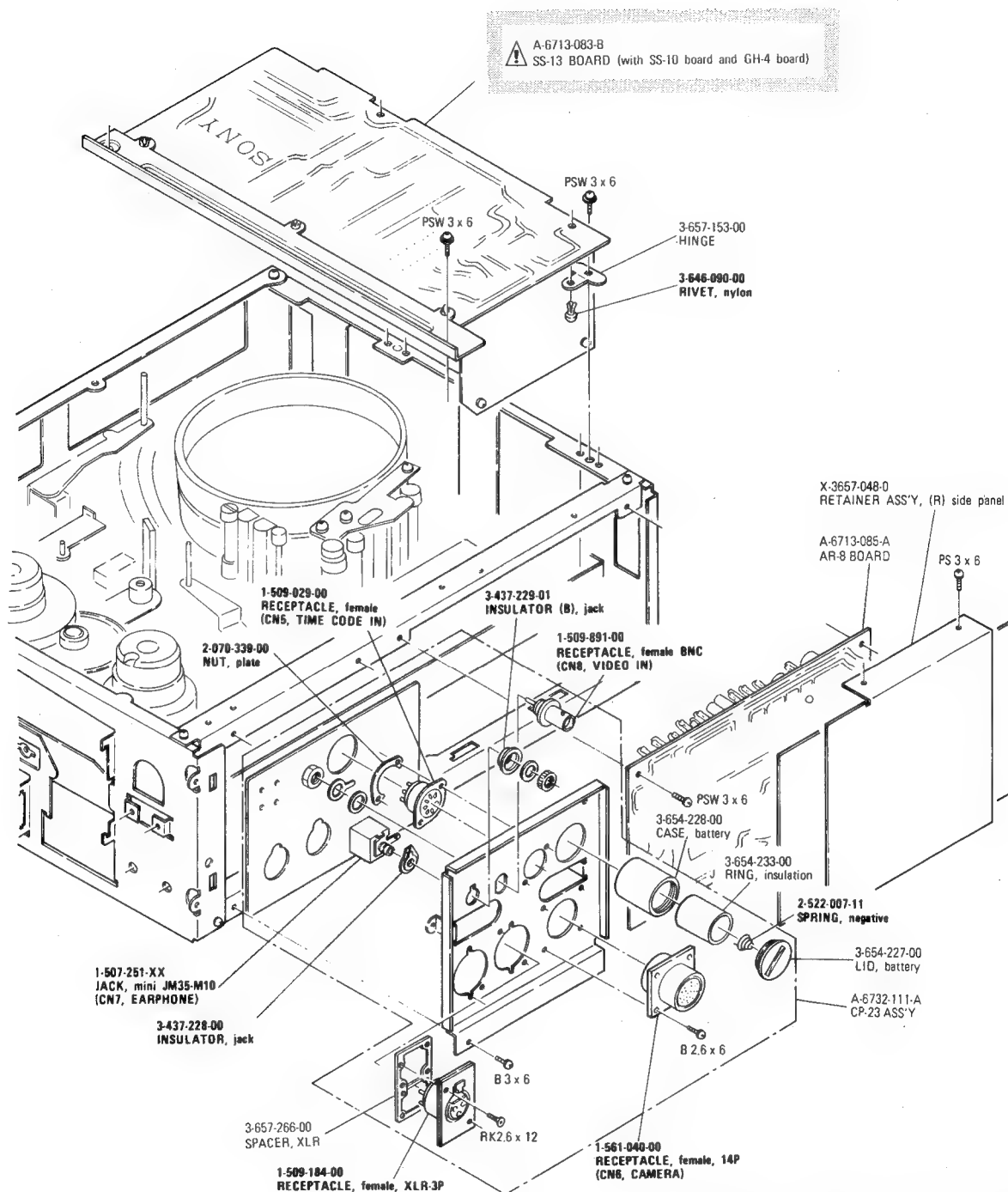
Tape Threading Block



NOTE:

1. Parts printed in **Bold-Face** type are normally stocked for replacement purposes. The remaining parts shown in this manual are not normally required for routine service work. Orders for parts not shown in **Bold-Face** type will be processed, but allow for additional delivery time.
2. Item with no part number and/or no description are not stocked because they are seldom required for routine service.

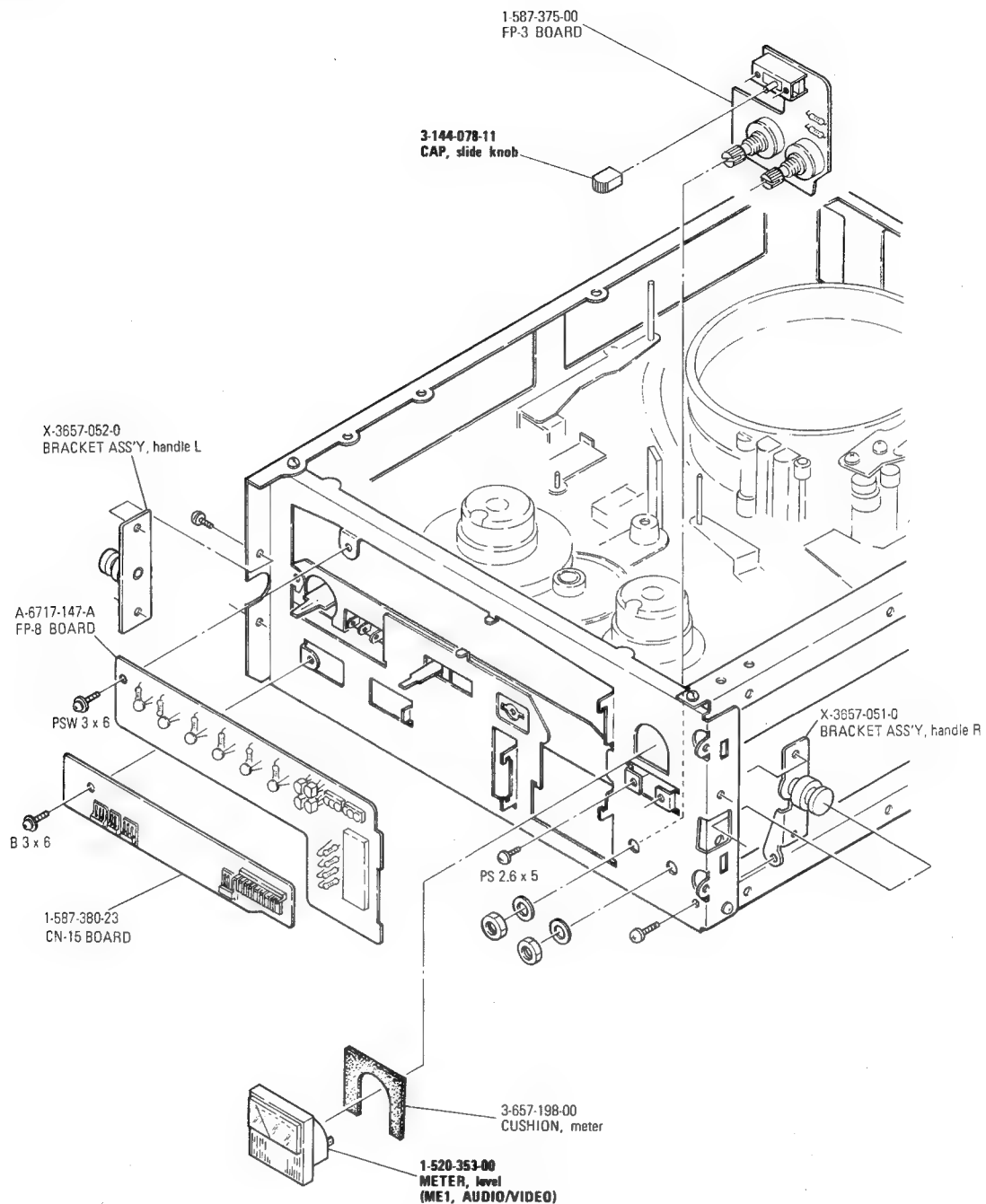
Chassis Block (1) connector panel and printed circuit boards



NOTE:

1. The shaded and -marked components are critical to safety. Replace only with same components as specified.
2. Parts printed in **Bold-Face type** are normally stocked for replacement purposes. The remaining parts shown in this manual are not normally required for routine service work. Orders for parts not shown in **Bold-Face type** will be processed, but allow for additional delivery time.
3. Item with no part number and/or no description are not stocked because they are seldom required for routine service.

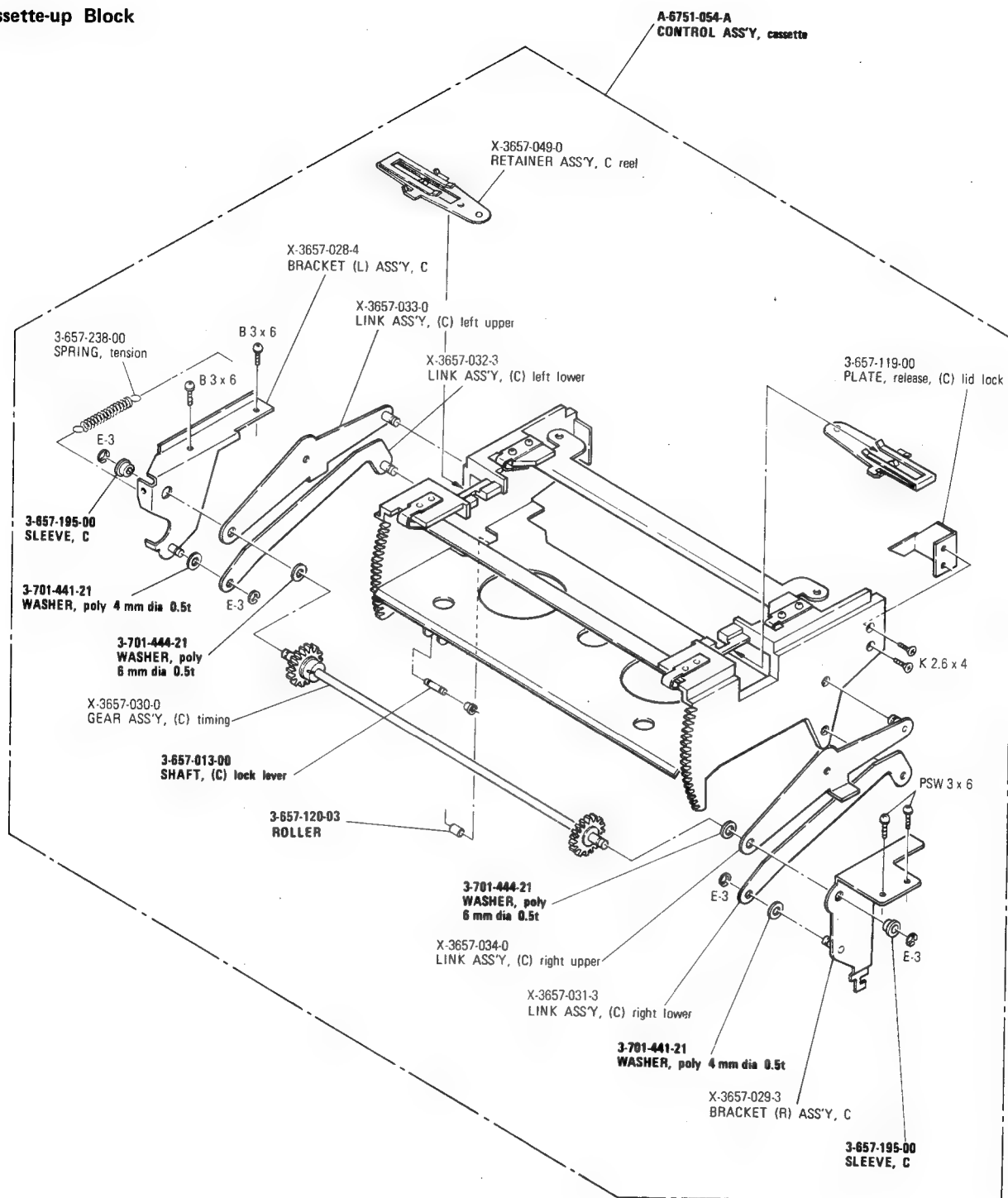
Chassis Block (2) front side



NOTE:

1. Parts printed in **Bold-Face** type are normally stocked for replacement purposes. The remaining parts shown in this manual are not normally required for routine service work. Orders for parts not shown in **Bold-Face** type will be processed, but allow for additional delivery time.
2. Item with no part number and/or no description are not stocked because they are seldom required for routine service.

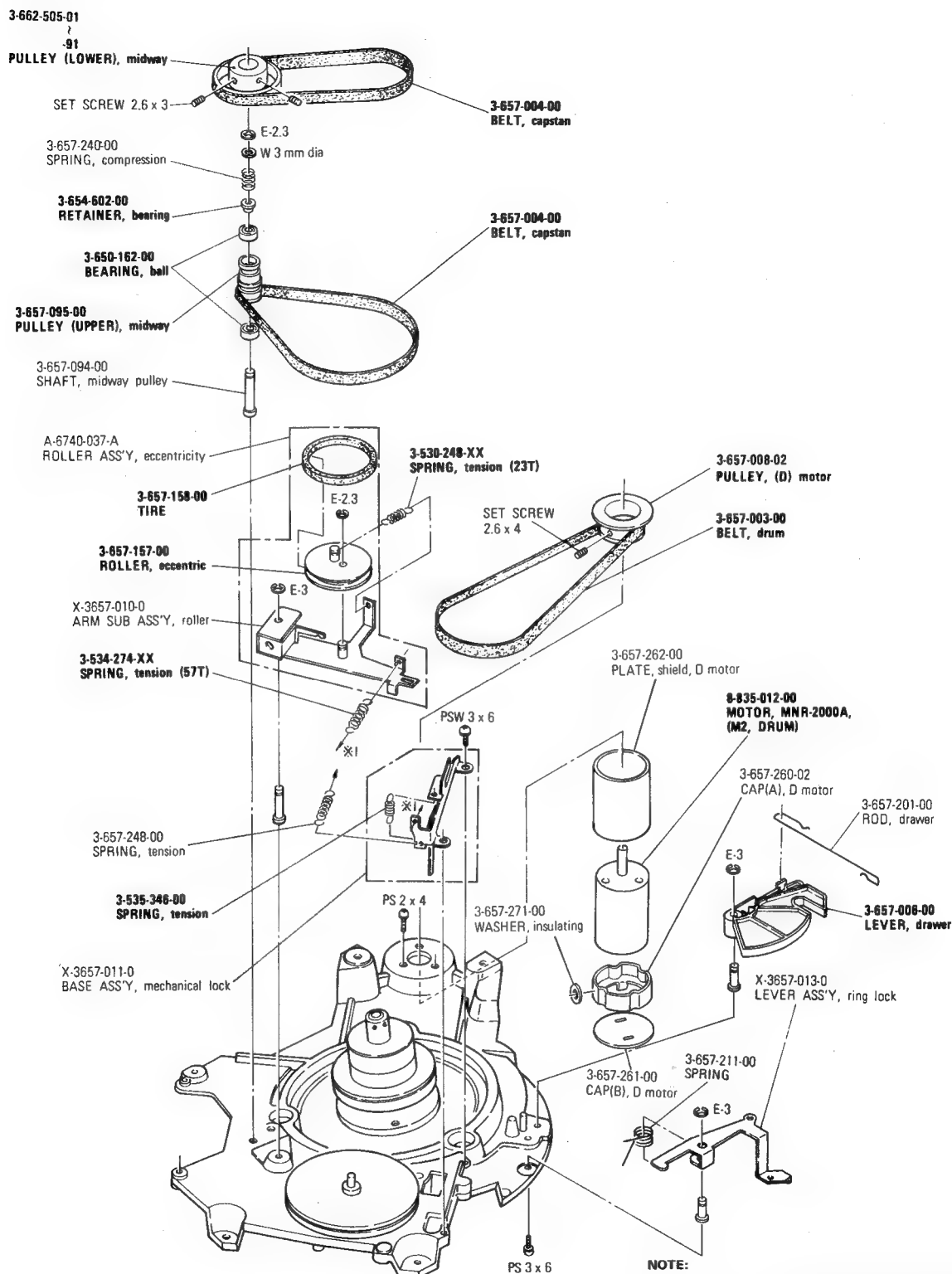
Cassette-up Block



NOTE:

1. Parts printed in **Bold-Face type** are normally stocked for replacement purposes. The remaining parts shown in this manual are not normally required for routine service work. Orders for parts not shown in **Bold-Face type** will be processed, but allow for additional delivery time.
2. Item with no part number and/or no description are not stocked because they are seldom required for routine service.

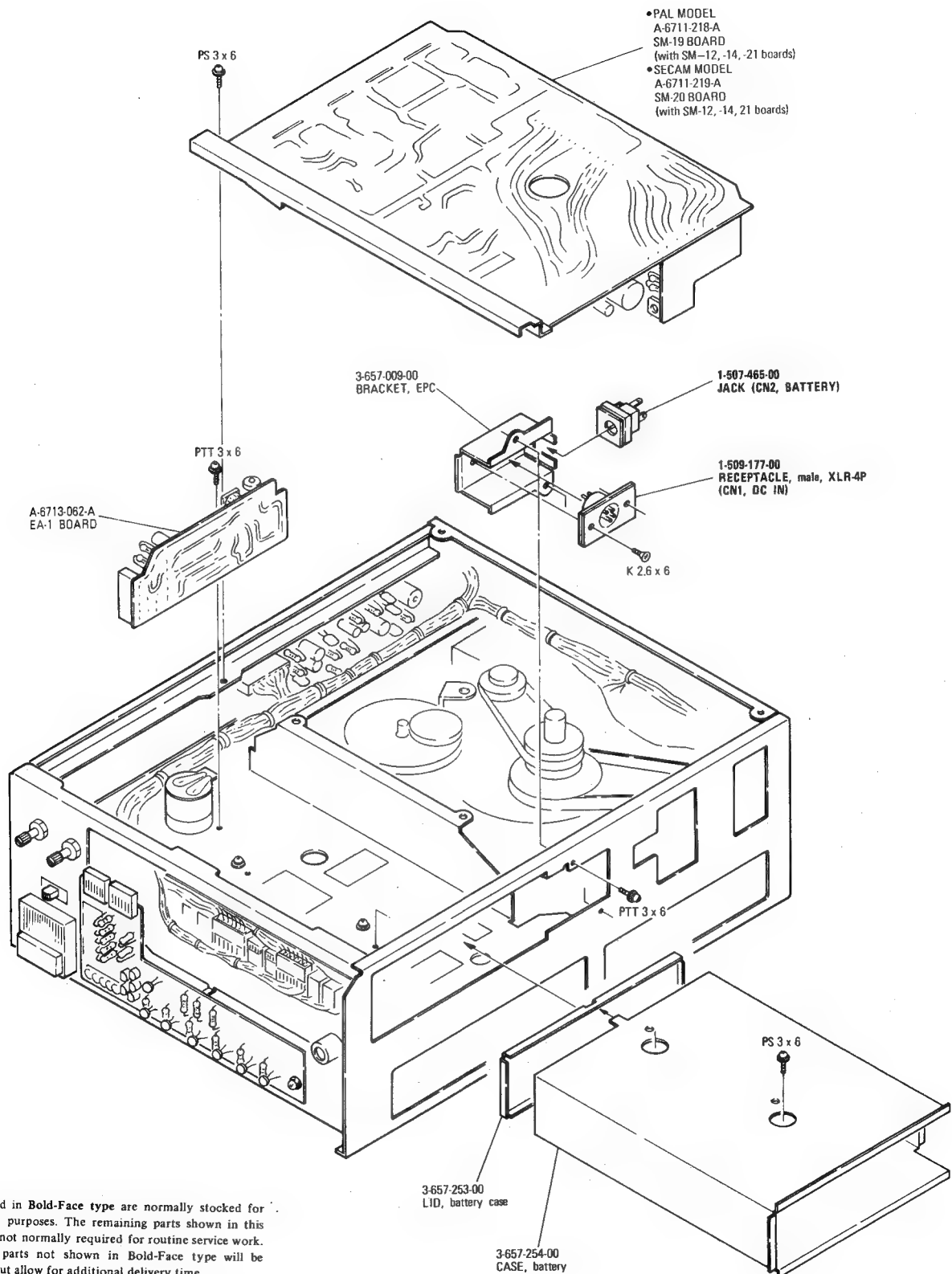
Bottom View (1) driving system



1. Parts printed in **Bold-Face** type are normally stocked for replacement purposes. The remaining parts shown in this manual are not normally required for routine service work. Orders for parts not shown in **Bold-Face** type will be processed, but allow for additional delivery time.

2. Item with no part number and/or no description are not stocked because they are seldom required for routine service.

Bottom View (2) battery case and printed circuit boards



NOTE:

1. Parts printed in **Bold-Face type** are normally stocked for replacement purposes. The remaining parts shown in this manual are not normally required for routine service work. Orders for parts not shown in **Bold-Face type** will be processed, but allow for additional delivery time.
2. Item with no part number and/or no description are not stocked because they are seldom required for routine service.

13-3. ELECTRICAL PARTS LIST

Parts that are not listed in the "reference numbers order list" are shown in following table.

Reference numbers are omitted.

SILVERED MICA CAPACITOR

1 pF through 620 pF
± 5%, 50WV



Parts No. 1-107-□□□-00

Value	Parts No. -□□□-	Value	Parts No. -□□□-	Value	Parts No. -□□□-	Value	Parts No. -□□□-
1 pF	098	15 pF	065	51 pF	078	180 pF	091
2	099	16	066	56	079	200	092
3	100	18	067	62	080	220	093
4	101	20	068	68	081	240	094
5	102	22	069	75	082	270	095
6	103	24	070	82	083	300	096
7	104	27	071	91	084	330	097
8	105	30	072	100	085	360	231
9	106	33	073	110	086	390	232
10	061	36	074	120	087	430	233
11	062	39	075	130	088	470	234
12	063	43	076	150	089	510	235
13	064	47	077	160	090	560	236
						620	237

CERAMIC CAPACITOR

0.001μF through 0.1μF
50WV

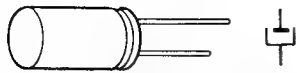


Parts NO. 1-161-□□□-00

Value	Parts No. -□□□-	Substitute	Value	Parts No. -□□□-	Substitute
0.001 μF	039	(1-102-074-00)	0.01 μF	051	(1-101-118-00)
0.0012	040		0.012	052	
0.0015	041		0.015	053	
0.0018	042		0.018	054	
0.0022	043	(1-102-100-00)	0.022	055	(1-101-005-00)
0.0027	044		0.027	056	
0.0033	045		0.033	057	
0.0039	046	(1-102-124-00)	0.039	058	
0.0047	047		0.047	059	(1-101-006-00)
0.0056	048		0.056	060	
0.0068	049		0.068	061	
0.0082	050		0.082	062	
			0.1	063	

ELECTROLYTIC CAPACITOR

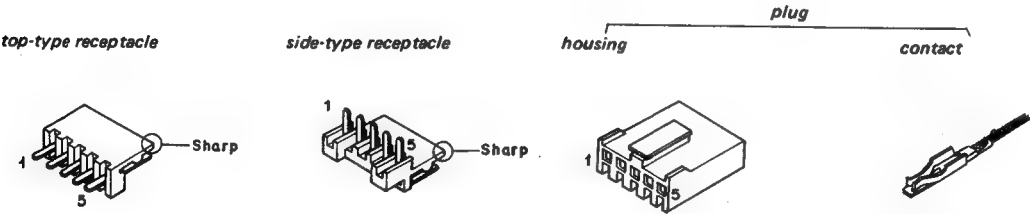
0.47μF through 470μF
6.3WV through 50 (63, 100)WV



Parts No. 1-123-□□□-00

Value	Parts No. -□□□-	Value	Parts No. -□□□-	Value	Parts No. -□□□-
0.47μF 50V	379	22μF 35V	342	100μF 50V	360
100		50	371	220 6.3	308
1 50	380	63		10	
100		33 6.3	318	16	321
2.2 50	381	10		25	334
100		16	343	35	346
3.3 25	382	25		50	361
35		35	372	330 6.3	309
50		50		10	
100		63	306	16	322
4.7 25	369	47 6.3		25	335
35		10	332	35	347
50		16		50	362
63		25	359	470 6.3	298
10 10	356	35		10	310
16		50	307	16	323
25		100 6.3		25	336
35		10	333	35	348
50	330	16		50	377
22 16		25	345	63	
25		35			

CONNECTOR



2P	1-508-900-00
3P	1-508-901-00
4P	1-508-902-00
5P	1-508-903-00
6P	1-508-904-00
8P	1-508-905-00
10P	1-508-906-00
12P	1-508-949-00

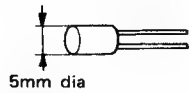
2P	1-508-933-00
3P	1-508-934-00
4P	1-508-950-00
5P	1-508-935-00
6P	1-508-936-00
8P	1-508-937-00
10P	1-508-951-00
12P	1-508-997-00

2P	1-509-983-00
3P	1-509-984-00
4P	1-509-985-00
5P	1-509-986-00
6P	1-509-987-00
8P	1-509-988-00
10P	1-509-989-00
12P	1-561-056-00

1-509-982-00

MICRO INDUCTOR

1 μ H through 470 μ H
 $\pm 5\%$

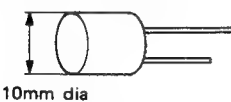


Parts No. 1-407-□□□-XX

Value	Parts No. -□□□-	Value	Parts No. -□□□-	Value	Parts No. -□□□-	Value	Parts No. -□□□-
1 μ H	178	4.7 μ H	186	22 μ H	161	100 μ H	169
1.2	179	5.6	187	27	162	120	170
1.5	180	6.8	188	33	163	150	171
1.8	181	8.2	189	39	164	180	172
2.2	182	10	157	47	165	220	173
2.7	183	12	158	56	166	270	174
3.3	184	15	159	68	167	330	175
3.9	185	18	160	82	168	390	176
						470	177

MICRO INDUCTOR

470 μ H through 33 mH
 $\pm 5\%$

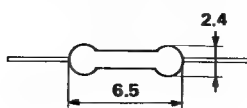
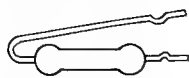


Parts No. 1-407-□□□-00

Value	Parts No. -□□□-	Value	Parts No. -□□□-	Value	Parts No. -□□□-	Value	Parts No. -□□□-
470 μ H	488	1.5 mH	494	4.7 mH	500	15 mH	506
560	489	1.8	495	5.6	501	18	507
680	490	2.2	496	6.8	502	22	508
820	491	2.7	497	8.2	503	27	509
1 mH	492	3.3	498	10	504	33	510
1.2	493	3.9	499	12	505		

CARBON RESISTOR (1/4W)

± 5%, 1/4W, non-special type
1 Ω through 1 M Ω



Parts No. 1-246-□□□-00

Value	Parts No. -□□□-	Value	Parts No. -□□□-	Value	Parts No. -□□□-	Value	Parts No. -□□□-
1 Ω	401	33 Ω	437	1 k Ω	473	33 k Ω	509
1.1	402	36	438	1.1	474	36	510
1.2	403	39	439	1.2	475	39	511
1.3	404	43	440	1.3	476	43	512
1.5	405	47	441	1.5	477	47	513
1.6	406	51	442	1.6	478	51	514
1.8	407	56	443	1.8	479	56	515
2	408	62	444	2	480	62	516
2.2	409	68	445	2.2	481	68	517
2.4	410	75	446	2.4	482	75	518
2.7	411	82	447	2.7	483	82	519
3	412	91	448	3.0	484	91	520
3.3	413	100 Ω	449	3.3	485	100 k Ω	521
3.6	414	110	450	3.6	486	110	522
3.9	415	120	451	3.9	487	120	523
4.3	416	130	452	4.3	488	130	524
4.7	417	150	453	4.7	489	150	525
5.1	418	160	454	5.1	490	160	526
5.6	419	180	455	5.6	491	180	527
6.2	420	200	456	6.2	492	200	528
6.8	421	220	457	6.8	493	220	529
7.5	422	240	458	7.5	494	240	530
8.2	423	270	459	8.2	495	270	531
9.1	424	300	460	9.1	496	300	532
10 Ω	425	330	461	10 k Ω	497	330	533
11	426	360	462	11	498	360	534
12	427	390	463	12	499	390	535
13	428	430	464	13	500	430	536
15	429	470	465	15	501	470	537
16	430	510	466	16	502	510	538
18	431	560	467	18	503	560	539
20	432	620	468	20	504	620	540
22	433	680	469	22	505	680	541
24	434	750	470	24	506	750	542
27	435	820	471	27	507	820	543
30	436	910	472	30	508	910	544
						1 M Ω	545

CARBON RESISTOR (1/8W)

±5%, 1/8W, non-special type
2.2Ω through 1MΩ



Parts No. 1-246-□□□-00

Value	Parts No. -□□□-	Value	Parts No. -□□□-	Value	Parts No. -□□□-	Value	Parts No. -□□□-
1Ω	—	33Ω	765	1kΩ	783	33kΩ	801
1.1	—	36	826	1.1	844	36	862
1.2	—	39	766	1.2	784	39	802
1.3	—	43	827	1.3	845	43	863
1.5	—	47	767	1.5	785	47	803
1.6	—	51	828	1.6	846	51	864
1.8	—	56	768	1.8	786	56	804
2	—	62	829	2	847	62	865
2.2	751	68	769	2.2	787	68	805
2.4	812	75	830	2.4	848	75	866
2.7	752	82	770	2.7	788	82	806
3	813	91	831	3.0	849	91	867
3.3	753	100Ω	771	3.3	789	100kΩ	807
3.6	814	110	832	3.6	850	110	868
3.9	754	120	772	3.9	790	120	808
4.3	815	130	833	4.3	851	130	869
4.7	755	150	773	4.7	791	150	809
5.1	816	160	834	5.1	852	160	870
5.6	756	180	774	5.6	792	180	810
6.2	817	200	835	6.2	853	200	871
6.8	757	220	775	6.8	793	220	811
7.5	818	240	836	7.5	854		
8.2	758	270	776	8.2	794		
9.1	819	300	837	9.1	855		
10Ω	759	330	777	10kΩ	795		
11	820	360	838	11	856		
12	760	390	778	12	796		
13	821	430	839	13	857		
15	761	470	779	15	797		
16	822	510	840	16	858		
18	762	560	780	18	798		
20	823	620	841	20	859		
22	763	680	781	22	799		
24	824	750	842	24	860		
27	764	820	782	27	800		
30	825	910	843	30	861		

Parts No. 1-247-□□□-00

Value	Parts No. -□□□-
240kΩ	054
270	046
300	055
330	047
360	056
390	048
430	057
470	049
510	058
560	050
620	059
680	051
750	060
820	052
910	061
1MΩ	053

ABBREVIATIONS

Ref. No.	Description	Ref. No.	Description	Ref. No.	Description
C□□, CV□□	CAPACITOR	IC□□	IC	Q□□	TRANSISTOR
CF□□	CERAMIC FILTER	J□□	JACK	R□□, RV□□	RESISTOR
CN□□	CONNECTOR	L□□, LV□□	INDUCTOR	RY□□	RELAY
D□□	DIODE	M□□	MOTOR	S□□, SW□□	SWITCH
DL□□	DELAY LINE	ME□□	METER	SB□□	SOLAR BATTERY
F□□	FUSE	MIC□□	MICROPHONE	T□□	TRANSFORMER
FB□□	FERRITE BEAD	PG□□	PG COIL	TH□□	THERMISTOR
FL□□	FILTER	PL□□	LAMP	X□□	CRYSTAL
H□□	HEAD	PM□□	SOLENOIDE		


All capacitors are in micro farads unless otherwise specified.

All inductors are in micro henries unless otherwise specified.

All resistors are in ohms.

Ref. No.	Parts No.	Description	Ref. No.	Parts No.	Description
AR-8 BOARD			C201	1-108-555-00	MYLAR 0.001 5% 50V
	A-6713-085-A	MOUNTED CIRCUIT BOARD "AR-8"	C202	1-131-209-00	TANTALUM 0.1 10% 35V
C1	1-108-583-00	MYLAR 0.015 5% 50V	C204	1-102-112-00	CERAMIC 330PF B 10% 50V
C2	1-108-593-00	MYLAR 0.039 5% 50V	C209	1-131-209-00	TANTALUM 0.1 10% 35V
C5	1-130-062-00	POLYPROPYLENE 0.0056 5% 630V	C217	1-108-563-00	MYLAR 0.0022 5% 50V
C8	1-129-702-00	POLYPROPYLENE 0.001 10% 630V	C219	1-131-209-00	TANTALUM 0.1 10% 35V
C65	1-108-567-00	MYLAR 0.033 5% 50V	C220	1-108-579-00	MYLAR 0.01 5% 50V
C66	1-131-347-00	TANTALUM 1.0 10% 35V	C221	1-108-555-00	MYLAR 0.001 5% 50V
C71	1-108-567-00	MYLAR 0.0033 5% 50V	C223	1-108-577-00	MYLAR 0.0082 5% 50V
C73	1-131-211-00	TANTALUM 0.22 10% 35V	C224	1-109-548-00	DIPPED MICA 360PF 5% 100V
C74	1-131-211-00	TANTALUM 0.22 10% 35V	C225	1-109-545-00	DIPPED MICA 270PF 5% 100V
C75	1-131-199-00	TANTALUM 10 10% 16V	C226	1-131-191-00	TANTALUM 47 10% 6.3V
C101	1-108-555-00	MYLAR 0.001 5% 50V	D1	8-719-815-55	1S1555
C102	1-131-209-00	TANTALUM 0.1 10% 35V	D62	8-719-815-55	1S1555
C104	1-102-112-00	CERAMIC 330P B 10% 50V	D63	8-719-815-55	1S1555
C109	1-131-209-00	TANTALUM 0.1 10% 35V	D65	8-719-130-07	RD3.0E-B
C117	1-108-563-00	MYLAR 0.0022 5% 50V	D101	8-719-815-55	1S1555
C119	1-131-209-00	TANTALUM 0.1 10% 35V	D201	8-719-815-55	1S1555
C120	1-108-579-00	MYLAR 0.01 5% 50V			
C121	1-108-555-00	MYLAR 0.001 5% 50V			
C123	1-108-577-00	MYLAR 0.0082 5% 50V			
C124	1-109-548-00	DIPPED MICA 360PF 5% 100V			
C125	1-109-545-00	DIPPED MICA 270PF 5% 100V			
C126	1-131-191-00	TANTALUM 47 10% 6.3V			

NOTES:

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Replace only with same components as specified.

2. Parts printed in **Bold-Face type** are normally stocked for replacement purposes. The remaining parts shown in this manual are not normally required for routine service work. Orders for parts not shown in Bold-Face type will be processed, but allow for additional delivery time.

Ref. No.	Parts No.	Description
IC61	8-759-271-30	TA7130P (TOSHIBA)
IC62	8-759-374-58	HA17458GS (HITACHI)
IC63	8-759-045-38	MC14538BCP, C-MOS (MOTOROLA)
IC64	8-759-270-60	TA7060P (TOSHIBA)
IC101	8-759-156-63	μ PC566H3 (NEC)
IC102	8-759-156-63	μ PC566H3 (NEC)
IC201	8-759-156-63	μ PC566H3 (NEC)
IC202	8-759-156-63	μ PC566H3 (NEC)

L102	1-408-154-00	VAR, 15mH
L202	1-408-154-00	VAR, 15mH

Q1	8-729-663-47	2SC1364
Q2	8-760-335-10	2SC1474
Q3	8-729-663-47	2SC1364
Q4	8-729-663-47	2SC1364
Q5	8-729-663-47	2SC1364

Q42	8-724-375-01	2SC403C
Q61	8-724-375-01	2SC403C
Q62	8-724-375-01	2SC403C
Q63	8-724-375-01	2SC403C
Q101	8-729-663-47	2SC1364

Q102	8-729-663-47	2SC1364
Q103	8-729-663-47	2SC1364
Q104	8-729-663-47	2SC1364
Q201	8-729-663-47	2SC1364
Q202	8-729-663-47	2SC1364

Q203	8-729-663-47	2SC1364
Q204	8-729-663-47	2SC1364

R72	1-214-176-00	METAL 68K 1/4W 1%
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RV41	1-224-253-XX	VAR, 22K
RV101	1-224-254-XX	VAR, 47K
RV102	1-224-253-XX	VAR, 22K
RV103	1-224-255-XX	VAR, 100K
RV201	1-224-254-XX	VAR, 47K

RV202	1-224-253-XX	VAR, 22K
RV203	1-224-255-XX	VAR, 100K

NOTES:

- The shaded and -marked components are critical to safety.
Replace only with same components as specified.

Ref. No.	Parts No.	Description
T1	1-433-232-00	BIAS OSC
T61	1-425-704-00	HIGH FREQ
T62	1-426-032-00	TUNING
T63	1-426-032-00	TUNING
T101	1-423-226-00	INPUT/OUTPUT
T201	1-423-226-00	INPUT/OUTPUT

BRUSH BOARD

1-539-394-00	PRINTED CIRCUIT BOARD "BRUSH"
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CN-15 BOARD

1-587-380-22	PRINTED CIRCUIT BOARD "CN-15"
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1-533-087-00	HOLDER, FUSE
--------------	--------------

D1	8-719-815-55	1S1555
D2	8-719-815-55	1S1555

 F1	1-532-299-00	TIME-LAG 5A
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Q1	8-760-515-10	2SA772
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CN-16 BOARD

1-587-381-00	PRINTED CIRCUIT BOARD "CN-16"
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C1	1-123-325-00	ELECT 2200 20% 16V
----	--------------	--------------------

D1	8-719-200-02	10E-2
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- Parts printed in **Bold-Face type** are normally stocked for replacement purposes. The remaining parts shown in this manual are not normally required for routine service work. Orders for parts not shown in Bold-Face type will be processed, but allow for additional delivery time.

CN-16, CP-23, EA-1

Ref. No.	Parts No.	Description
Q1	8-729-331-53	2SC2315

Ref. No.	Parts No.	Description
RV1	1-224-605-00	VAR, 10K

 R1	1-207-920-00	WIREWOUND 2.7 3W 10%
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SW1	1-516-637-00	SLIDE "CH-2/R MIC SELECT"
SW2	1-516-637-00	SLIDE "AUDIO"

S1	1-553-578-00	MICRO "PINCH"
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TH1	1-800-198-00	S-1K
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CP-23 BOARD

A-6732-111-A MOUNTED CIRCUIT BOARD
"CP-23"

C3	1-131-217-00	TANTALUM 2.2 10% 35V
C4	1-131-209-00	TANTALUM 0.1 10% 35V

D1	8-719-168-07	RD6.8E-B
D2	8-719-133-07	RD3.3E-B
D3	8-719-815-55	1S1555
D4	8-719-815-55	1S1555
D5	8-719-815-55	1S1555
D6	8-719-815-55	1S1555

IC1	8-759-374-58	HA17458GS
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Q1	8-729-663-47	2SC1364
Q2	8-724-375-01	2SC403C
Q3	8-729-663-47	2SC1364
Q4	8-729-663-47	2SC1364
Q5	8-729-663-47	2SC1364
Q6	8-729-663-47	2SC1364

EA-1 BOARD

A-6713-062-A MOUNTED CIRCUIT BOARD
"EA-1"

C2	1-108-555-00	MYLAR 0.001 5% 50V
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D1	8-719-815-55	1S1555
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Q1	8-729-663-47	2SC1364
Q2	8-729-663-47	2SC1364
Q3	8-729-663-47	2SC1364
Q4	8-729-612-77	2SA1027R
Q5	8-729-663-47	2SC1364

RV1	1-224-493-00	VAR, 10K
RV2	1-224-489-00	VAR, 2.2K

T1	1-427-270-XX	OUTPUT
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TH1	1-800-200-00	S-3K
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Ref. No. Parts No. Description

FP-3 BOARD

	1-587-375-00	PRINTED CIRCUIT BOARD "FP-3"
RV13	1-224-207-00	VAR, 20K
RV23	1-224-207-00	VAR, 20K
SW1	1-514-633-00	SLIDE "METER SELECT"

Ref. No. Parts No. Description

Q6	8-729-631-02	2SC1310
Q7	8-729-631-02	2SC1310
Q8	8-729-631-02	2SC1310
Q9	8-729-631-02	2SC1310
Q10	8-729-631-02	2SC1310
Q11	8-729-631-02	2SC1310
Q13	8-729-631-02	2SC1310
Q14	8-729-631-02	2SC1310
S1	1-553-219-00	PUSH "RESET"
X1	1-527-378-00	4.194304MHz

FP-8 BOARD

	A-6717-147-A	MOUNTED CIRCUIT BOARD "FP-8"
C1	1-131-199-00	TANTALUM 10 10% 16V
D1	8-719-815-55	1S1555
D2	8-719-974-32	5082-7432
D3	8-719-974-32	5082-7432
D4	8-719-955-05	BR5505S
D5	8-719-955-05	BR5505S
D6	8-719-955-05	BR5505S
D7	8-719-955-05	BR5505S
D8	8-719-955-05	BR5505S
D9	8-719-955-05	BR5505S
D10	8-719-955-05	BR5505S
D11	8-719-100-43	RD7.5E-B1
IC1	8-759-955-09	MSM5509
Q1	8-760-413-10	2SC1475
Q2	8-729-631-02	2SC1310
Q3	8-729-631-02	2SC1310
Q4	8-729-631-02	2SC1310
Q5	8-729-631-02	2SC1310

GH-4 BOARD

	1-607-668-00	PRINTED CIRCUIT BOARD "GH-4"
C1	1-108-601-00	MYLAR 0.082 5% 50V
C2	1-108-597-00	MYLAR 0.056 5% 50V
C3	1-108-595-00	MYLAR 0.047 5% 50V
C4	1-131-344-00	TANTALUM 0.33 10% 35V
C5	1-131-367-00	TANTALUM 22 10% 20V
IC1	8-759-045-38	MC14538BCP, C-MOS (MOTOROLA)
RV1	1-224-256-XX	VAR, 220K
RV2	1-224-255-XX	VAR, 100K

HI-1 BOARD

	1-587-390-00	PRINTED CIRCUIT BOARD "HI-1"
IC1	8-759-408-38	DN838, HALL IC (PANASONIC)

LE BOARD

	1-583-561-00	PRINTED CIRCUIT BOARD "LE"
D1	8-719-900-07	KL-1, LED, INFRARED "TAPE END"

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RM, SM-12, SM-14

Ref. No.	Parts No.	Description
RM BOARD		
	1-583-559-00	PRINTED CIRCUIT BOARD "RM"
M1	8-835-011-00	DC, MNR-1900A "REEL"


SM-12 BOARD		
	A-6717-087-A	MOUNTED CIRCUIT BOARD "SM-12"
C3	1-131-237-00	TANTALUM 1.5 10% 25V
CN1	1-560-037-00	PIN, B-B 10P
D1	8-719-815-55	1S1555
D2	8-719-815-55	1S1555
D3	8-719-151-07	RD5.1E-B
D4	8-719-815-55	1S1555
D5	8-719-815-55	1S1555
D6	8-719-815-55	1S1555
D7	8-719-815-55	1S1555
IC1	8-759-205-14	TA7504S-R
Q1	8-729-663-47	2SC1364
Q2	8-729-304-92	2SB649A
Q3	8-729-612-77	2SA1027R
Q4	8-729-663-47	2SC1364
Q5	8-729-306-92	2SD669A
Q6	8-729-663-47	2SC1364
Q7	8-729-331-53	2SC2315
Q8	8-729-663-47	2SC1364
Q9	8-729-306-92	2SD669A

Ref. No.	Parts No.	Description
RV1	1-224-493-00	VAR, 10K
RV2	1-224-254-XX	VAR, 47K
TH1	1-800-198-XX	S-1K

SM-14 BOARD		
	A-6717-089-A	MOUNTED CIRCUIT BOARD "SM-14"
C3	1-131-209-00	TANTALUM 0.1 10% 35V
C6	1-131-209-00	TANTALUM 0.1 10% 35V
C9	1-131-209-00	TANTALUM 0.1 10% 35V
C15	1-131-191-00	TANTALUM 47 10% 6.3V
CN1	1-560-035-00	PIN, B-B 5P
CN2	1-560-037-00	PIN, B-B 10P
D1	8-719-815-55	1S1555
D2	8-719-815-55	1S1555
D3	8-719-815-55	1S1555
D4	8-719-151-07	RD5.1E-B
D5	8-719-815-55	1S1555
IC1	8-759-271-20	TA7120P
IC2	8-759-374-58	HA17458GS
Q1	8-729-663-47	2SC1364
Q2	8-729-663-47	2SC1364
Q3	8-729-663-47	2SC1364
Q4	8-729-663-47	2SC1364
Q5	8-729-663-47	2SC1364
RV1	1-224-661-00	VAR, 47K
RV2	1-224-491-00	VAR, 22K

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Ref. No.	Parts No.	Description	Ref. No.	Parts No.	Description
SM-19 BOARD			IC1	8-751-310-00	CX-131A (SONY)
	A-6711-218-A	MOUNTED CIRCUIT BOARD	IC2	8-759-270-60	TA7060P (TOSHIBA)
		"SM-19" (WITH SM-12, 21, 14)	IC3	8-751-880-00	CX-188 (SONY)
	1-517-072-00	LAMP HOLDER	IC4	8-759-240-66	TC4066BP, C-MOS (CD4066BE; RCA)
C17	1-131-211-00	TANTALUM 0.22 10% 35V	IC5	8-759-045-38	MC14538BCP, C-MOS (MOTOROLA)
C18	1-131-199-00	TANTALUM 10 10% 16V	IC6	8-743-731-00	BX-373A (SONY)
C21	1-109-687-00	DIPPED MICA 390PF 1% 500V	IC7	8-743-740-00	BX-374 (SONY)
C22	1-109-687-00	DIPPED MICA 390PF 1% 500V	IC201	8-749-931-90	BX-319 (SONY)
C35	1-109-557-00	DIPPED MICA 680PF 5% 100V			
C37	1-109-557-00	DIPPED MICA 680PF 5% 100V	L19	1-407-746-00	MICRO 47 10%
C40	1-109-545-00	DIPPED MICA 270PF 5% 100V			
C46	1-108-571-00	MYLAR 0.0047 5% 50V	LV1	1-407-566-00	VAR, 3.3
C54	1-109-555-00	DIPPED MICA 560PF 5% 100V	LV2	1-407-572-00	VAR, 33
C76	1-109-553-00	DIPPED MICA 470PF 5% 100V	LV201	1-409-305-00	VAR, 45mH
C77	1-108-581-00	MYLAR 0.012 5% 50V			
C78	1-108-579-00	MYLAR 0.01 5% 50V	Q1	8-724-375-01	2SC403C
C79	1-131-217-00	TANTALUM 2.2 10% 35V	Q2	8-724-375-01	2SC403C
C80	1-108-587-00	MYLAR 0.022 5% 50V	Q3	8-724-375-01	2SC403C
C82	1-131-217-00	TANTALUM 2.2 10% 35V	Q4	8-724-375-01	2SC403C
C85	1-102-759-00	CERAMIC 62PF UJ 5% 50V	Q5	8-726-600-00	2SC1126
C99	1-131-195-00	TANTALUM 33 10% 10V	Q6	8-724-375-01	2SC403C
CN106	1-561-375-00	(M) 1P	Q7	8-729-663-47	2SC1364
CV1	1-141-167-00	TRIMMER 18PF	Q8	8-729-663-47	2SC1364
D1	8-719-815-55	1S1555	Q9	8-724-375-01	2SC403C
D2	8-719-709-25	1S1925-P	Q10	8-724-375-01	2SC403C
D3	8-719-709-25	1S1925-P	Q11	8-724-375-01	2SC403C
D4	8-719-815-55	1S1555	Q12	8-724-375-01	2SC403C
D5	8-719-815-55	1S1555	Q13	8-724-375-01	2SC403C
D6	8-719-815-59	1S1555-S	Q201	8-729-663-47	2SC1364
D7	8-719-815-55	1S1555			
D8	8-719-915-43	FC54M	R32	1-214-136-00	METAL 1.5K 1/4W 1%
D202	8-719-815-55	1S1555	R33	1-214-122-00	METAL 390 1/4W 1%
D203	8-719-815-55	1S1555	R82	1-214-091-00	METAL 20 1/4W 1%
			R83	1-214-091-00	METAL 20 1/4W 1%
			R84	1-214-091-00	METAL 20 1/4W 1%
FL1	1-231-380-00	LOWPASS			

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Ref. No.	Parts No.	Description
R85	1-214-091-00	METAL 20 1/4W 1%
R88	1-214-161-00	METAL 16K 1/4W 1%
R89	1-214-168-00	METAL 33K 1/4W 1%
R90	1-214-148-00	METAL 4.7K 1/4W 1%
R91	1-214-169-00	METAL 36K 1/4W 1%
R92	1-214-180-00	METAL 100K 1/4W 1%
RV1	1-224-251-XX	VAR, 4.7K
RV2	1-224-251-XX	VAR, 4.7K
RV3	1-224-250-XX	VAR, 2.2K
RV4	1-224-251-XX	VAR, 4.7K
RV5	1-224-254-XX	VAR, 47K
RV6	1-224-249-XX	VAR, 1K
RV7	1-224-249-XX	VAR, 1K
RV8	1-224-252-XX	VAR, 10K
RV9	1-224-252-XX	VAR, 10K
RV10	1-224-251-XX	VAR, 4.7K
RV11	1-224-249-XX	VAR, 1K
T1	1-425-879-00	BANDPASS
T2	1-426-017-00	AF
T3	1-427-472-00	OUTPUT
T4	1-427-472-00	OUTPUT
T5	1-425-880-21	BURST AMP
TH1	1-800-200-00	S-3K
TM1	1-548-119-00	HOURS METER, FULL SCALE 1000H
X1	1-527-374-00	5.3574218 MHz
X2	1-527-345-00	4.433619 MHz

Ref. No.	Parts No.	Description
SM-21 BOARD		
	A-6716-146-A	MOUNTED CIRCUIT BOARD "SM-21"
C7	1-131-199-00	TANTALUM 10 10% 16V
C9	1-131-199-00	TANTALUM 10 10% 16V
C11	1-131-232-00	TANTALUM 4.7 10% 16V
CN1	1-560-036-00	PIN, B-B 6P
CN2	1-560-035-00	PIN, B-B 5P
D1	8-719-200-02	10E-2
D2	8-719-200-02	10E-2
D3	8-719-100-29	RD5.1E-B1
IC1	8-759-374-58	HA17458GS
L1	1-407-885-00	MICRO 0.1mH 10%
L2	1-407-557-00	MICRO 680μH 10%
Q1	8-760-514-10	2SA772
Q2	8-729-663-47	2SC1364
Q3	8-760-413-10	2SC1475
Q4	8-760-413-10	2SC1475
Q5	8-729-304-93	2SB649A
Q6	8-729-304-93	2SB649A
Q7	8-760-413-10	2SC1475
RV1	1-224-489-00	VAR, 2.2K
RV2	1-224-489-00	VAR, 2.2K
T1	1-433-192-00	OSC

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Ref. No. Parts No. Description

SS-10 BOARD

	A-6713-084-A	MOUNTED CIRCUIT BOARD "SS-10"
C201	1-109-560-00	DIPPED MICA 910PF 5% 100V
C202	1-109-553-00	DIPPED MICA 470PF 5% 100V
C204	1-109-553-00	DIPPED MICA 470PF 5% 100V
C205	1-131-213-00	TANTALUM 0.47 10% 35V
C206	1-108-587-00	MYLAR 0.022 5% 50V
C207	1-108-591-00	MYLAR 0.033 5% 50V
C208	1-130-039-00	POLYPROPYLENE 0.068 5% 50V
C209	1-131-209-00	TANTALUM 0.1 10% 35V
C210	1-131-199-00	TANTALUM 10 10% 16V
C211	1-108-579-00	MYLAR 0.01 5% 50V
C212	1-108-579-00	MYLAR 0.01 5% 50V
C213	1-131-209-00	TANTALUM 0.1 10% 35V
C214	1-131-209-00	TANTALUM 0.1 10% 35V
C217	1-131-195-00	TANTALUM 33 10% 10V
C218	1-131-232-00	TANTALUM 4.7 10% 16V
C219	1-131-199-00	TANTALUM 10 10% 16V
C221	1-108-555-00	MYLAR 0.001 5% 50V
C222	1-108-555-00	MYLAR 0.001 5% 50V
CN1	1-560-038-00	PIN, B-B 20P
D201	8-719-815-55	1S1555
D202	8-719-815-55	1S1555
IC201	8-759-045-38	MC14538BCP, C-MOS (MOTOROLA)
IC202	8-759-240-23	TC4023BP, C-MOS (CD4023BE; RCA)
IC203	8-759-045-38	MC14538BCP, C-MOS (MOTOROLA)
IC204	8-759-045-38	MC14538BCP, C-MOS (MOTOROLA)
IC205	8-759-240-13	TC4013BP, C-MOS (CD4013BE; RCA)
IC206	8-759-308-07	HA1807 (HITACHI)
Q201	8-724-375-01	2SC403C
Q202	8-724-375-01	2SC403C
Q203	8-724-375-01	2SC403C

Ref. No. Parts No. Description

R204	1-214-171-00	METAL 43K 1/4W 1%
R205	1-214-174-00	METAL 56K 1/4W 1%
R209	1-214-173-00	METAL 51K 1/4W 1%
R210	1-214-174-00	METAL 56K 1/4W 1%
R213	1-214-156-00	METAL 10K 1/4W 1%


R214	1-214-163-00	METAL 20K 1/4W 1%
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SS-13 BOARD

 A-6713-083-B MOUNTED CIRCUIT BOARD
"SS-13" (WITH SS-10, GH-4)

C2	1-131-217-00	TANTALUM 2.2 10% 35V
C3	1-131-217-00	TANTALUM 2.2 10% 35V
C5	1-131-217-00	TANTALUM 2.2 10% 35V
C7	1-131-217-00	TANTALUM 2.2 10% 35V
C8	1-131-344-00	TANTALUM 0.33 10% 35V
C10	1-131-217-00	TANTALUM 2.2 10% 35V
C15	1-131-211-00	TANTALUM 0.22 10% 35V
C16	1-131-218-00	TANTALUM 3.3 10% 35V
C19	1-131-199-00	TANTALUM 10 10% 16V
C20	1-131-201-00	TANTALUM 22 10% 16V
C25	1-131-199-00	TANTALUM 10 10% 16V
C26	1-102-114-00	CERAMIC 470PF B 10% 50V
C27	1-102-114-00	CERAMIC 470PF B 10% 50V
C28	1-131-198-00	TANTALUM 6.8 10% 16V
C30	1-131-217-00	TANTALUM 2.2 10% 35V
C32	1-102-114-00	CERAMIC 470PF B 10% 50V
C33	1-102-114-00	CERAMIC 470PF B 10% 50V
C101	1-129-879-00	POLYPROPYLENE 0.047 5% 50V
C102	1-129-879-00	POLYPROPYLENE 0.047 5% 50V
C103	1-129-879-00	POLYPROPYLENE 0.047 5% 50V
C104	1-108-595-00	MYLAR 0.047 5% 50V
C105	1-131-213-00	TANTALUM 0.47 10% 35V
C106	1-108-555-00	MYLAR 0.001 5% 50V
C107	1-108-599-00	MYLAR 0.068 5% 50V
C108	1-108-591-00	MYLAR 0.033 5% 50V
C109	1-108-555-00	MYLAR 0.001 5% 50V
C110	1-131-232-00	TANTALUM 4.7 10% 16V
C111	1-108-595-00	MYLAR 0.047 5% 50V
C112	1-108-599-00	MYLAR 0.068 5% 50V

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C113	1-131-199-00	TANTALUM 10 10% 16V
C115	1-131-201-00	TANTALUM 22 10% 16V
C117	1-108-565-00	MYLAR 0.0027 5% 50V
C119	1-108-587-00	MYLAR 0.022 5% 50V
C120	1-131-191-00	TANTALUM 47 10% 6.3V
C121	1-108-587-00	MYLAR 0.022 5% 50V
C122	1-108-599-00	MYLAR 0.068 5% 50V
C124	1-131-199-00	TANTALUM 10 10% 16V
C126	1-131-232-00	TANTALUM 4.7 10% 16V
C127	1-131-232-00	TANTALUM 4.7 10% 16V
C128	1-131-232-00	TANTALUM 4.7 10% 16V
C129	1-108-583-00	MYLAR 0.015 5% 50V
CN1	1-560-049-00	PIN 30P
D1	8-719-815-55	1S1555
D2	8-719-815-55	1S1555
D3	8-719-815-55	1S1555
D4	8-719-815-55	1S1555
D5	8-719-815-55	1S1555
D6	8-719-815-55	1S1555
D7	8-719-815-55	1S1555
D8	8-719-815-55	1S1555
D9	8-719-815-55	1S1555
D10	8-719-815-55	1S1555
D11	8-719-815-55	1S1555
D12	8-719-815-55	1S1555
D13	8-719-815-55	1S1555
D14	8-719-815-55	1S1555
D15	8-719-815-55	1S1555
D16	8-719-815-55	1S1555
D17	8-719-815-55	1S1555
D18	8-719-815-55	1S1555
D19	8-719-815-55	1S1555
D21	8-719-815-55	1S1555
D22	8-719-815-55	1S1555
D23	8-719-100-31	RD5.1E-B3
D24	8-719-815-55	1S1555
D25	8-719-815-55	1S1555
D26	8-719-815-55	1S1555
D27	8-719-815-55	1S1555
D28	8-719-815-55	1S1555
D29	8-719-815-55	1S1555
D30	8-719-815-55	1S1555
D31	8-719-815-55	1S1555

Ref. No.	Parts No.	Description
D32	8-719-815-55	1S1555
D33	8-719-100-56	RD10E-B1
D34	8-719-815-55	1S1555
D36	8-719-815-55	1S1555
D37	8-719-815-55	1S1555
D38	8-719-815-55	1S1555
D39	8-719-815-55	1S1555
D40	8-719-815-55	1S1555
D41	8-719-815-55	1S1555
D42	8-719-815-55	1S1555
D101	8-719-815-55	1S1555
D102	8-719-815-55	1S1555
D103	8-719-815-55	1S1555
D109	8-719-815-55	1S1555
D110	8-719-815-55	1S1555
D111	8-719-100-40	RD6.8E-B1
D112	8-719-815-55	1S1555
D113	8-719-815-55	1S1555
D114	8-719-815-55	1S1555
D115	8-719-815-55	1S1555
IC1	8-759-240-81	TC4081BP, C-MOS (CD4081BE; RCA)
IC2	8-759-240-71	TC4071BP, C-MOS (CD4071BE; RCA)
IC3	8-759-904-69	MSM4069, C-MOS (CD4069BE; RCA)
IC4	8-759-240-20	TC4020BP, C-MOS (CD4020BE; RCA)
IC5	8-759-904-69	MSM4069, C-MOS (CD4069BE; RCA)
IC6	8-759-240-81	TC4081BP, C-MOS (CD4081BE; RCA)
IC7	8-759-240-81	TC4081BP, C-MOS (CD4081BE; RCA)
IC8	8-759-240-15	TC4015BP, C-MOS (CD4015BE; RCA)
IC9	8-759-045-38	MC14538BCP, C-MOS (MOTOROLA)
IC10	8-759-240-13	TC4013BP, C-MOS (CD4013BE; RCA)

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Ref. No.	Parts No.	Description
IC11	8-759-240-30	TC4030BP, C-MOS (CD4070BE; RCA)
IC12	8-759-045-38	MC14538BCP, C-MOS (MOTOROLA)
IC13	8-759-240-13	TC4013BP, C-MOS (CD4013BE; RCA)
IC14	8-759-240-71	TC4071BP, C-MOS (CD4071BE; RCA)
IC15	8-759-240-81	TC4081BP, C-MOS (CD4081BE; RCA)
IC16	8-759-250-81	TC5081P, C-MOS (TOSHIBA)
IC17	8-759-240-20	TC4020BP, C-MOS (CD4020BE; RCA)
IC18	8-759-240-71	TC4071BP, C-MOS (CD4071BE; RCA)
IC101	8-751-430-00	CX-143A (SONY)
IC102	8-759-132-40	μPC324C (LM324; NSC)

Q1	8-729-631-02	2SC1310
Q2	8-729-631-02	2SC1310
Q4	8-729-631-02	2SC1310
Q5	8-729-631-02	2SC1310
Q6	8-729-631-02	2SC1310

Q101	8-724-375-01	2SC403C
Q102	8-761-622-00	2SC1636
Q104	8-729-331-53	2SC2315
Q105	8-729-612-77	2SA1027R
Q106	8-729-331-53	2SC2315

R42	1-214-165-00	METAL 24K 1/4W 1%
R54	1-210-829-00	CARBON 5.1M 1/4W 5%
R71	1-214-165-00	METAL 24K 1/4W 1%
R101	1-214-173-00	METAL 51K 1/4W 1%
R102	1-214-164-00	METAL 22K 1/4W 1%


R103	1-214-165-00	METAL 24K 1/4W 1%
R108	1-214-177-00	METAL 75K 1/4W 1%

 R129 1-207-620-00 WIREWOUND 1.0 3W 10%

RV1	1-224-254-XX	VAR, 47K
RV101	1-224-254-XX	VAR, 47K
RV102	1-224-254-XX	VAR, 47K

X1	1-567-064-00	34.400kHz
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NOTES:

1. The shaded and -marked components are critical to safety.
Replace only with same components as specified.

Ref. No.	Parts No.	Description
SW-15 BOARD		
	1-587-378-14	PRINTED CIRCUIT BOARD "SW-15"
D1	8-719-168-07	RD6.8E-B
M1	1-541-163-00	DC, RF510T "THREADING" When replace this motor in the machine of serial number up to 10275(P), 10020(S), also replace the SW-15 board with new one (1-587-378-14).
Q1	8-760-413-10	2SC1475
Q2	8-729-663-47	2SC1364

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W-25, VH-1, FRAME

Ref. No. Parts No. Description

SW-25 BOARD

A-6725-119-A MOUNTED CIRCUIT BOARD
"SW-25"

C2 1-131-215-00 TANTALUM 1 10% 35V
C5 1-102-114-00 CERAMIC 470PF B 10% 50V
C6 1-108-563-00 MYLAR 0.0022 5% 50V

D1 8-719-815-55 1S1555
D2 8-719-815-55 1S1555

IC1 8-759-240-93 TC4093BP, C-MOS (CD4093BE; RCA)
IC2 8-759-240-13 TC4013BP, C-MOS (CD4013BE; RCA)

Q1 8-729-631-02 2SC1310

S1 1-552-492-00 PUSH "REC"

VH-1 BOARD

1-587-466-00 PRINTED CIRCUIT BOARD
"VH-1"

FRAME

C1 1-161-857-00 0.001 50V, FEED THROUGH
C2 1-161-857-00 0.001 50V, FEED THROUGH

Ref. No. Parts No. Description

CN1 1-509-177-00 RECEPTACLE, (M) XLR-4P
"EXT. DC IN"

CN2 1-507-465-00 JACK, BATTERY

CN3 1-509-184-00 RECEPTACLE, (F) XLR-3P
"MIC IN CH-1/L"

CN4 1-509-184-00 RECEPTACLE, (F) XLR-3P
"MIC IN CH-2/R"

CN5 1-509-029-00 RECEPTACLE, (F) "TIME
CODE IN"

CN6 1-561-040-00 RECEPTACLE, (F) 14P
"CAMERA"

CN7 1-507-251-XX JACK, JM-35, M-10 "EARPHONE"

CN8 1-509-891-00 RECEPTACLE, (F) BNC "VIDEO
IN"

CS1 1-586-633-00 CONDENSATION SENSOR

D1 8-719-900-07 KL-1, LED, INFRARED "TAPE END"

H1 A-6709-302-A DUR-19-R "VIDEO HEAD
ASS'Y"

H2 8-829-371-00 PP171-5802C "TIME CODE"

H3 8-829-358-40 PP150-5803B "AUDIO/CTL"

H4 8-825-545-10 EF233-58 "FULL ERASE"

(P ---- S/N, Up to 10725)
(S ---- S/N, Up to 10105)

8-825-544-40 EF248-58 "FULL ERASE"

(P ---- S/N, 10726 and higher)
(S ---- S/N, 10106 and higher)

M2 8-835-012-00 DC, MNR-2000A "DRUM"

ME1 1-520-353-00 LEVEL "AUDIO/VIDEO"

PM1 1-454-197-00 8 OHM (MAIN), 15 OHM (SUB)
WITH A PERMANENT MAGNET
"PINCH"

S1 1-553-578-00 MICRO "POWER"

S2 1-553-577-11 MICRO "UNTHREADING END"

S3 1-553-577-11 MICRO "EJECT-3"

S4 1-553-577-11 MICRO "MISS REC"

S5 1-552-493-00 MICRO "EJECT-2"

S6 1-552-493-00 MICRO "EJECT-1"

S7 1-552-637-00 MICRO "THREADING END"

SB1 8-719-435-02 BP-3502LP "TAPE END DET."

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13-4. PACKING MATERIAL & ACCESSORY (SUPPLIED)

Ref. No.	Parts No.	Description
	2-249-503-02	BELT, SHOULDER (ONE PAIR)
	3-662-756-00	BELT, STRAP (SINGLE)
	3-657-241-00	CUSHION, UPPER
	3-657-243-00	CUSHION, FRONT
	3-657-244-00	CUSHION, REAR
	3-657-256-00	HOLDER, CG (P ---- S/N, Up to 10625) (S ---- S/N, Up to 10105)
	3-657-274-02	CASE, CG (P ---- S/N, Up to 10625) (S ---- S/N, Up to 10105)
	3-657-284-00	CASE, BVG (P ---- S/N, 10626 and higher) (S ---- S/N, 10106 and higher)
	3-657-275-02	CASE, CARRYING (P ---- S/N, Up to 10625) (S ---- S/N, Up to 10105)
	3-657-275-04	CASE, CARRYING (P ---- S/N, 10626 and higher) (S ---- S/N, 10106 and higher)
	3-662-508-00	CARTON, INDIVIDUAL
	3-701-633-00	BAG, POLY (FOR MANUAL)
	3-701-639-00	BAG, POLY (FOR BVU-50P/-50S)

13-5. TOOL (OPTIONAL)

Ref. No.	Parts No.	Description
	J-600-182-0A	DRUM ECCENTRICITY GAUGE (3)
	J-600-183-0A	DRUM ECCENTRICITY GAUGE (2)
	J-600-184-0A	DRUM ECCENTRICITY GAUGE (1)
	J-600-193-0A	DRUM ECCENTRICITY GAUGE (4)
	J-600-228-0A	TORQUE MEASUREMENT TAPE (80 MM DIA.)
	J-600-495-0A	BVU-50 PB CHECK JIG
	J-600-229-0A	DIHEDRAL ADJUSTING SCREW
	J-600-983-0A	FLATNESS PLATE
	J-613-001-0A	REEL TABLE HEIGHT CHECK BASE JIG
	J-613-002-0A	REEL TABLE HEIGHT CHECK JIG
	J-614-054-0A	VIDEO HEAD AZIMUTH JIG
	Y-2031-001-0	CLEANING FLUID
	2-034-697-00	CHAMOIS
	7-732-050-20	TENSION SCALE (50G FULL SCALE)
	7-732-050-30	TENSION SCALE (100G FULL SCALE)
	7-732-050-40	TENSION SCALE (200G FULL SCALE)
	7-732-051-02	TENSION SCALE (1000G FULL SCALE)
	8-960-020-61	ALIGNMENT TAPE, RR5-1SB PAL (FOR BVU-50P)
	8-960-020-82	ALIGNMENT TAPE, RR5-2SB SECAM (FOR BVU-50S)
	9-911-053-00	THICKNESS GAUGE
	STANDARD PRODUCTS KCS-20 CASSETTE TAPE	

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